ELECTRICAL WEST

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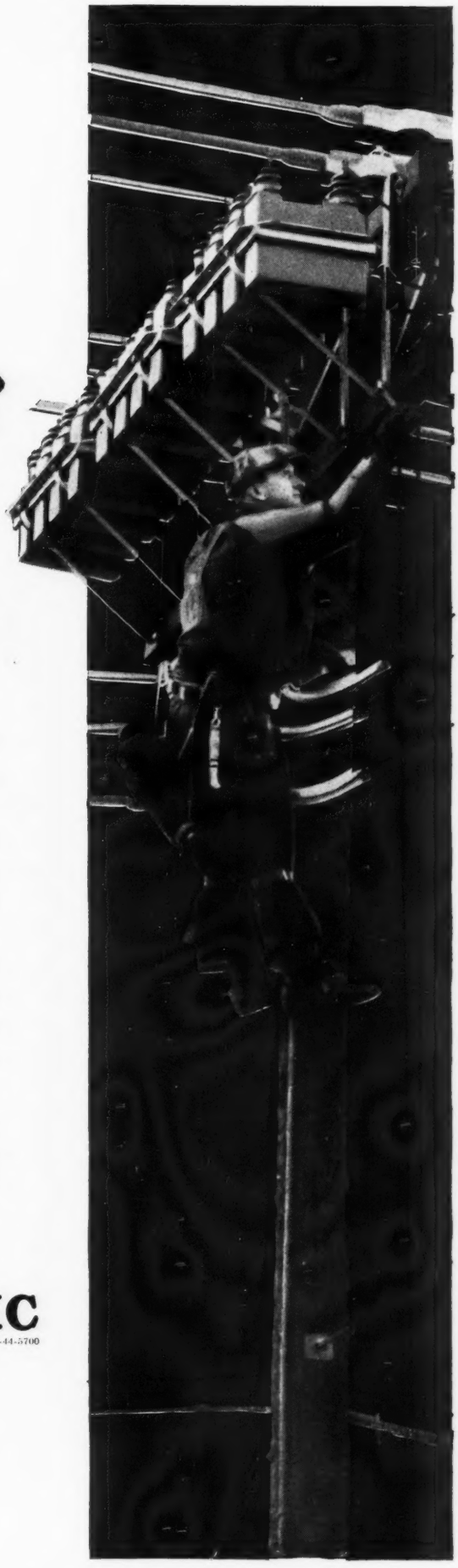
IN 3 HOURS



HE HAS CLEARED THE WIRES FOR MORE KILOWATTS!

COST? ABOUT $7 PER KVA...AND WITH BIG SAVINGS IN VITAL COPPER

DEPENDING on their power factor, circuits that are fully loaded can carry from 10 to 40 per cent more load after G-E Pyranol capacitors have been installed.

Capacitors for an entire distribution system can be obtained and installed in a matter of weeks; they require only a fraction of the critical materials you would use in the installation of new feeders or generating equipment.

Ask your G-E representative today for a preliminary estimate of the capacity increase that's possible with Pyranol capacitors. Or write for GEA-3333. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

407-44-5700

Here in the WEST

People

C. W. Macy
who tells, on p. 60, of diagnostic lighting of a machine shop for war production, the first of two articles, is an illuminating sales engineer, Pacific Gas and Electric Co., San Francisco division. Born in New York, he served in World War I, studied after it at Ecole de Commerce, Toulouse, France, has worked for utilities and General Electric in the East. He drove a Model T to California in 1924, sold gas appliances, joined PG and E and from 1937-40 was company agent at Vacaville. Back in San Francisco, his varied experiences are employed in aiding war industries see more to do more. The next month's article will tell personal reactions of workmen to better lighting.

L. A. Williams
who writes about power company reclamation departments, p. 57, is executive assistant to the president of Puget Sound Power & Light Co. at Seattle. He started with the company in 1934 as advertising manager and later served as advertising sales promotion manager. In 1936 he was appointed district manager at Everett, Wash., and was promoted to his present position as assistant to Frank McLaughlin in 1941.

Pages

It's Women's Work Now 47
Pacific Gas and Electric reports that in department after department women are filling—and very capably—erstwhile masculine jobs.

Some Modern Dogs of War 51
By J. HARVEY LEACH—Canine guards help Puget Sound Power & Light meet manpower shortage.

Carrier Current Can Provide More KWH 52
By G. S. LUNGE—How various applications of carrier current to transmission line operation can increase energy available.

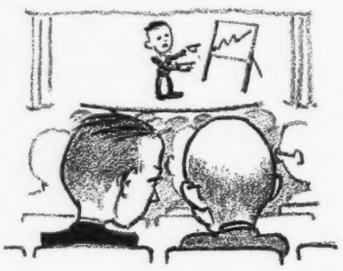
Meeting Southwest War Power Demands 55
By FRED B. LEWIS—Full use of interconnections plus coordinated operation of generating facilities has assured ample electric power for all requirements.

New Products 14
Bulletins 35
Electra 44
Engineering 52
Lighting and Wiring 60
Sales 69
Editorial 74
Associations 76
News 80

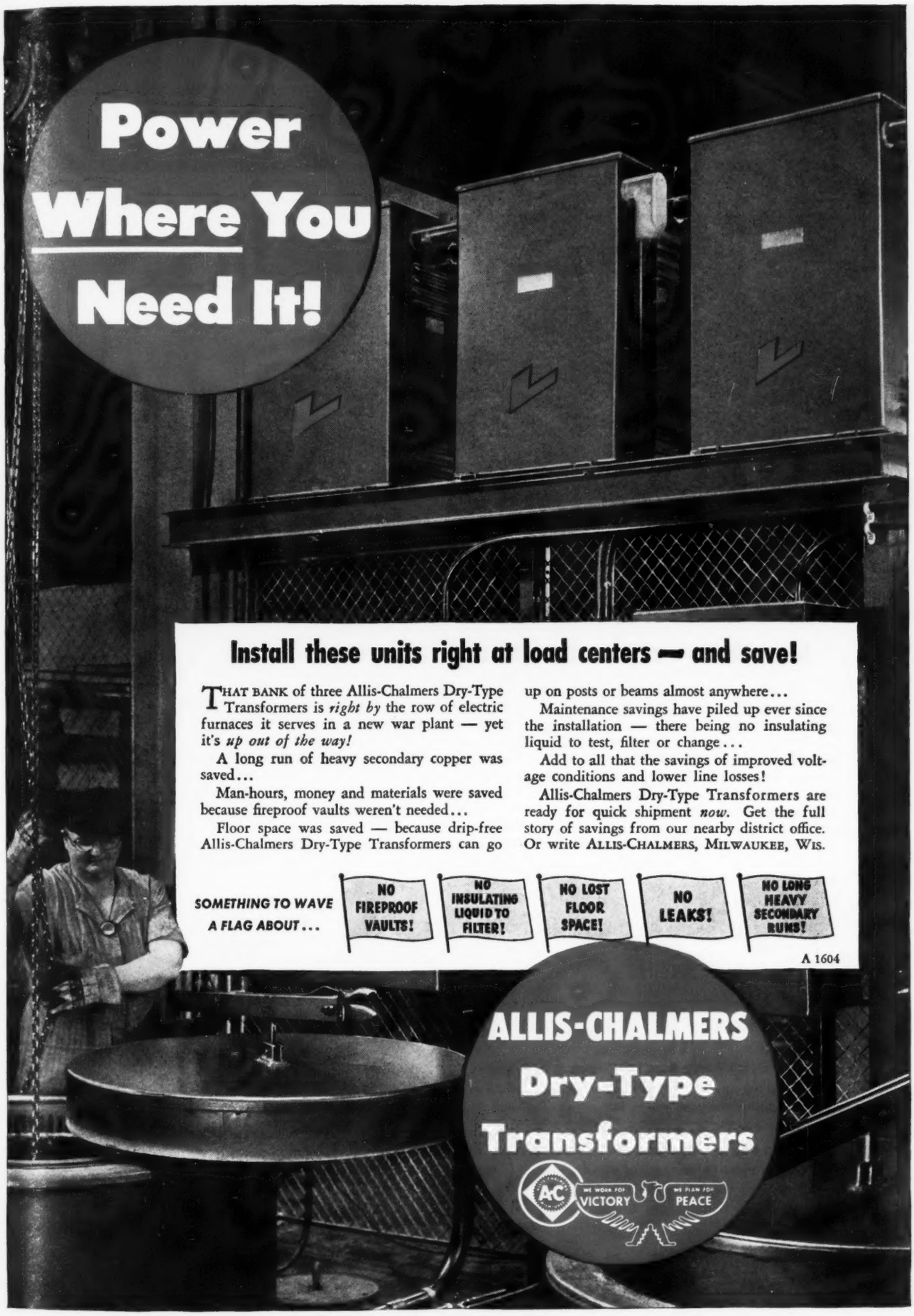
Cover photo: Winifred Schochdopole, Southern California Edison Co. meter reader at Compton.

Preview

Convention-in-Print
It was a depression then, it is a suppression now that puts the time-honored institution of conventions into the "future reference" file as it did back in the 1930's. A tightened belt on expenses was the restrainant then. Nowadays it is rail and travel priority necessarily given the armed forces and war production that reduces the former conventions to a few concentrated war conferences. These a few of the key men attend today to interchange vitally needed information as to ways of doing the war job and to coordinate efforts where the activities of one touch upon or depend upon another. But the inspiration and the broader perspective that came from attending a big convention are missing. Much of this came from fellowship, for which there is no substitute in print, of course. Personal "bull sessions," too, contributed much.



However
the intellectual content of a convention can be brought to each reader of this magazine, sometimes to better effect, through the convention-in-print, read more comfortably at home or office from a decent chair than listened to from what chairs convention hotels torture delegates with in meeting halls. The June issue will be such a comfortable convention. Its program will include presidential addresses, an inspirational survey of the industry at war, public relations and personnel studies, an engineering symposium, a glimpse of future industrial development in the West.



Install these units right at load centers — and save!

THAT BANK of three Allis-Chalmers Dry-Type Transformers is *right by* the row of electric furnaces it serves in a new war plant — yet it's *up out of the way!*

A long run of heavy secondary copper was saved...

Man-hours, money and materials were saved because fireproof vaults weren't needed...

Floor space was saved — because drip-free Allis-Chalmers Dry-Type Transformers can go up on posts or beams almost anywhere...

Maintenance savings have piled up ever since the installation — there being no insulating liquid to test, filter or change...

Add to all that the savings of improved voltage conditions and lower line losses!

Allis-Chalmers Dry-Type Transformers are ready for quick shipment *now*. Get the full story of savings from our nearby district office. Or write ALLIS-CHALMERS, MILWAUKEE, WIS.

SOMETHING TO WAVE A FLAG ABOUT...

NO FIREPROOF VAULTS! | NO INSULATING LIQUID TO FILTER! | NO LOST FLOOR SPACE! | NO LEAKS! | NO LONG HEAVY SECONDARY RUNS!

A 1604

FIVE SHIPS FOR ORDINARY WI

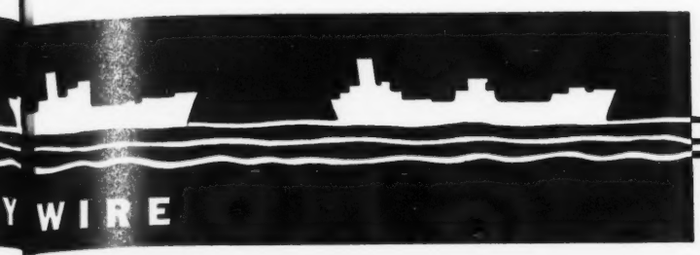
U. S. Rubber Laytex Army Assault Wire requires only one-fifth the shipping space of ordinary communication wire ...releases four times the room for men, material, food for overseas.

Light, strong and plenty tough, Laytex is the most flexible of all insulation for electrical conductors. It is waterproof, resists wide-range temperature changes...and will not shatter under concussion. Conductors are perfectly centered...because the unique Laytex Process applies the purified insulation in liquid form.

Laytex Assault Wire meets every basic requirement of the Armed Forces. It weighs less than 30 pounds per mile, twisted pair; has a breaking strength of 50 pounds per conductor; a talking distance of five miles. Millions of feet of Laytex Assault Wire are now on active duty wherever American Armies are in the field.

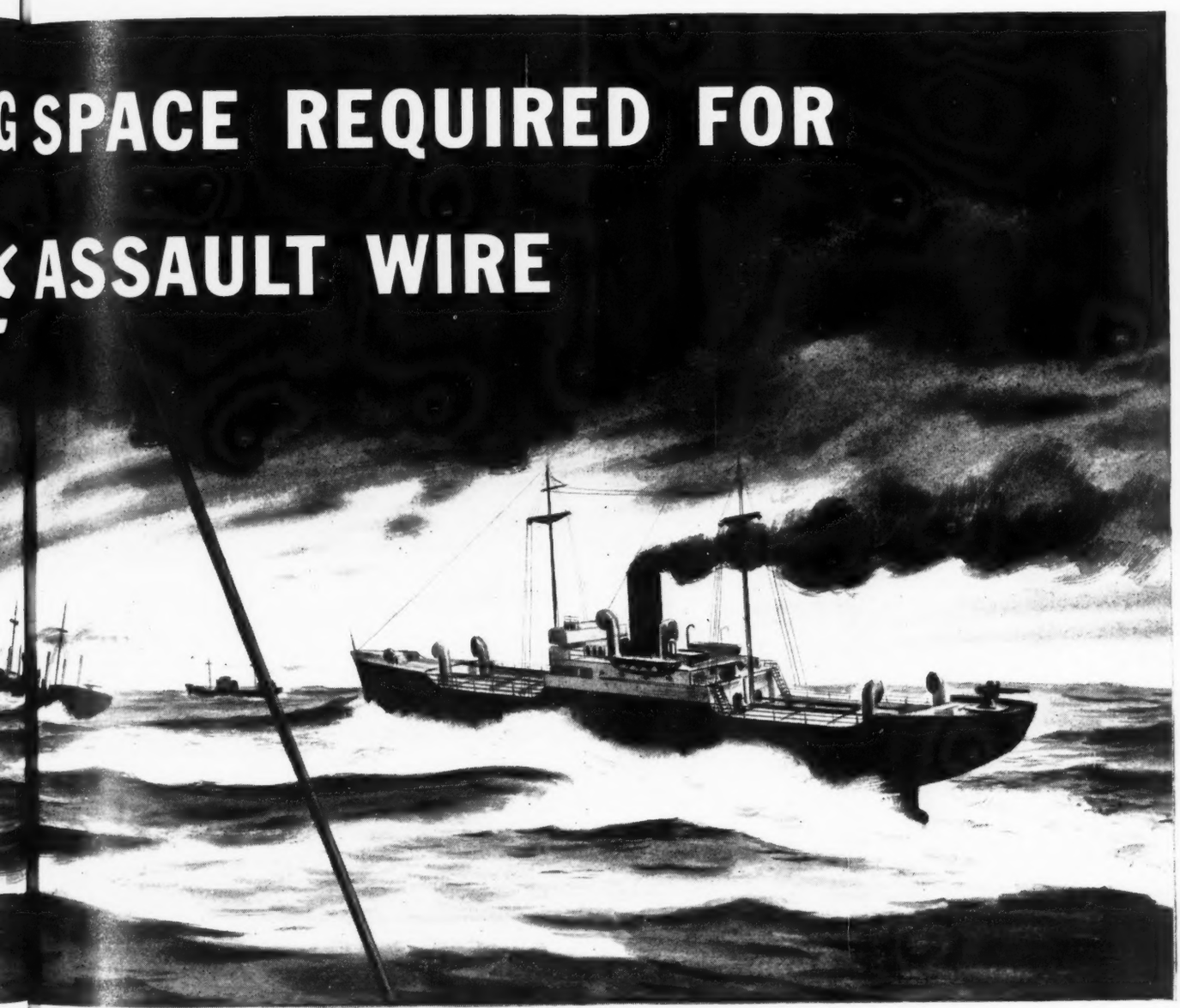
1230 Sixth Avenue Rockefeller

UNITED STATES R



ONE SHIP FOR
U. S. LAYTEX ASSAULT WIRE

G SPACE REQUIRED FOR
K ASSAULT WIRE
E



Laytex
REG. U PAT. OFF

ASSAULT WIRE MEETS EVERY BASIC MILITARY REQUIREMENT

Rockefell Center • New York

S RUBBER COMPANY

Every Day SINCE PEARL HARBOR 24,000 KVA of

These 17 months have brought A STILL BETTER PRODUCT WITH LESS MATERIAL, AND AT LOWER COST

HOW to greatly increase power-transformer production in the shortest possible time, *without* the time- and material-consuming procedure of *building new factories,* was a problem which our organization was already solving when the attack came December 7, 1941. Since then we have shipped more than 12,000,000 kva.

PRODUCTION STREAMLINED

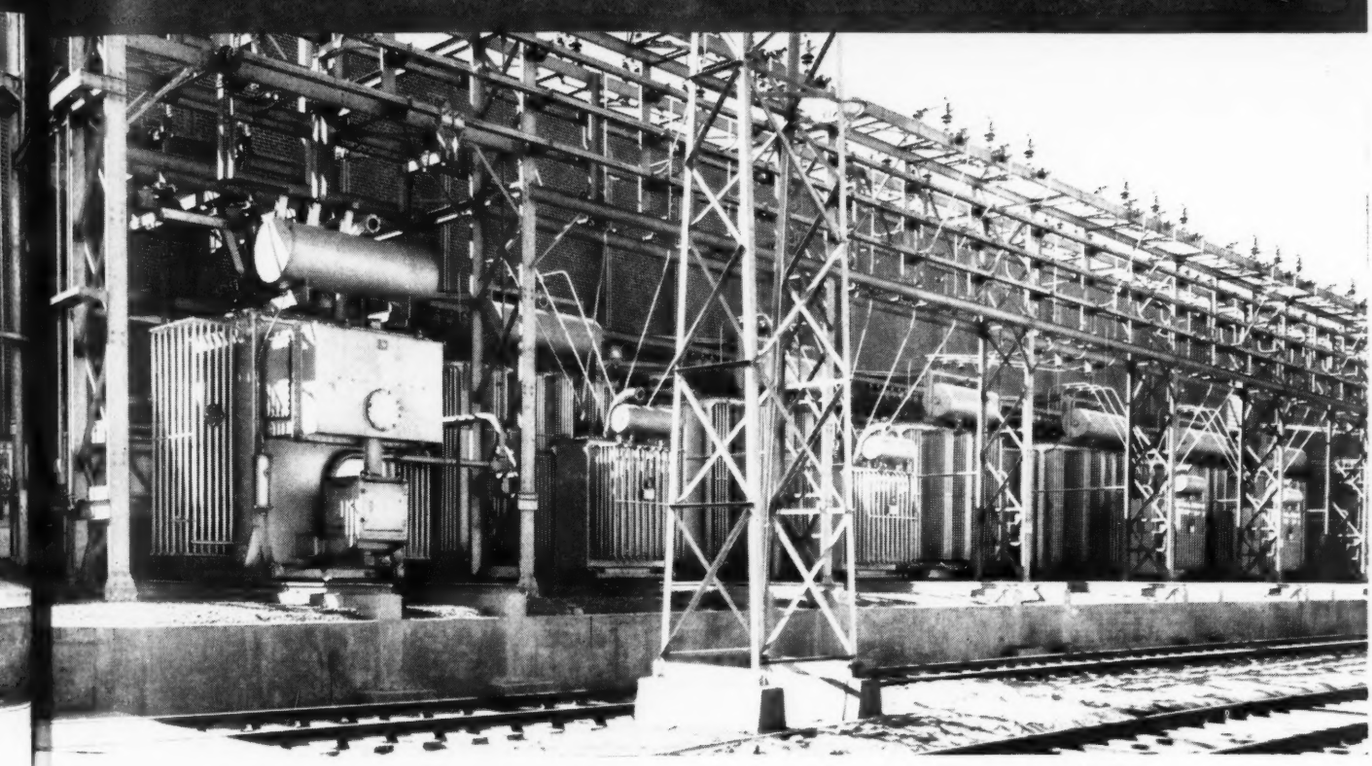
Before Pearl Harbor a far-sighted program had been launched to replace obsolescent equipment. To gear for war, our plant facilities were reorganized; manufacturing processes were regrouped; bottlenecks were anticipated and ironed out before they could develop. (For example, the facilities for vacuum drying of core-and-coils were augmented materially.) Experienced employees were given added responsibility and the opportunity to become leaders in the training of new personnel.

PURCHASER CO-OPERATION

Our customers, by allowing the duplication of existing designs; by recognizing the advantages of "packaged" unit substations and load-center power units; by using three-phase transformers; by specifying only standard accessories, have helped immeasurably to save skilled labor and production time. This has meant more power for war — FAST.

G-E POWER TRANSFORMERS

Have Been Placed in Service



G-E power transformers supplying a vital electrochemical plant in the West

and with the use of less critical material. Wherever possible, artificial means of cooling have been applied to transformers in service to increase system kva, rather than buying new transformers. Hence, the limited supply of new transformers could go to the spots where the need was greatest.

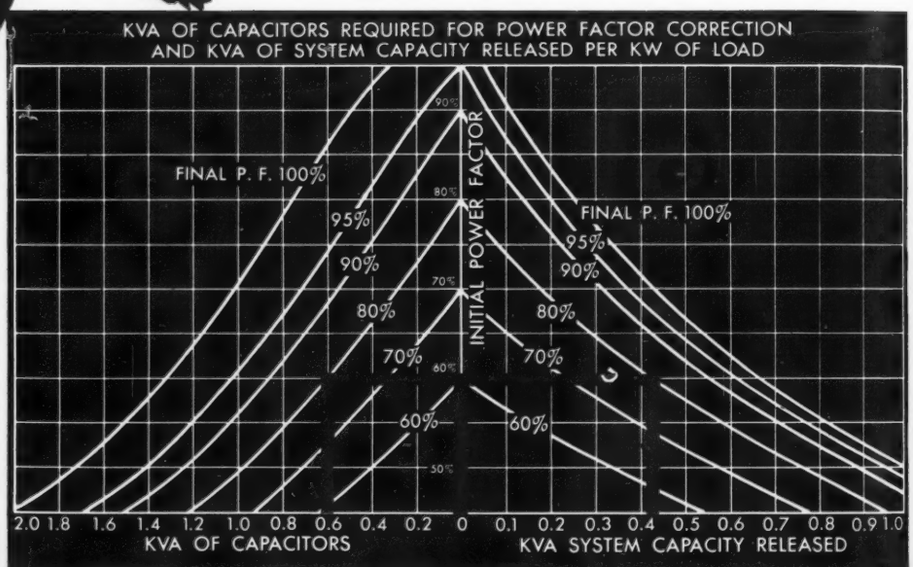
CRITICAL MATERIALS SAVED— AND BETTER POWER TRANSFORMERS

Not only was production accelerated because of repetitive manufacture, but also notable savings were made in critical materials, through the extensive use of cold-rolled core steel and by utilizing improved methods of cooling.

Today, as a result, you get a better transformer, and by "better" we mean not only improved all-round performance, but lighter weight, less floor space, larger sizes shipped in their own tanks, and all this at lower cost. *General Electric, Schenectady, N. Y.*

GENERAL ELECTRIC

Reduce



NOTE FROM THIS CHART HOW INERTEEN CAPACITORS release power capacity. Blue line indicates how capacitors solved the production problems of a midwest factory.

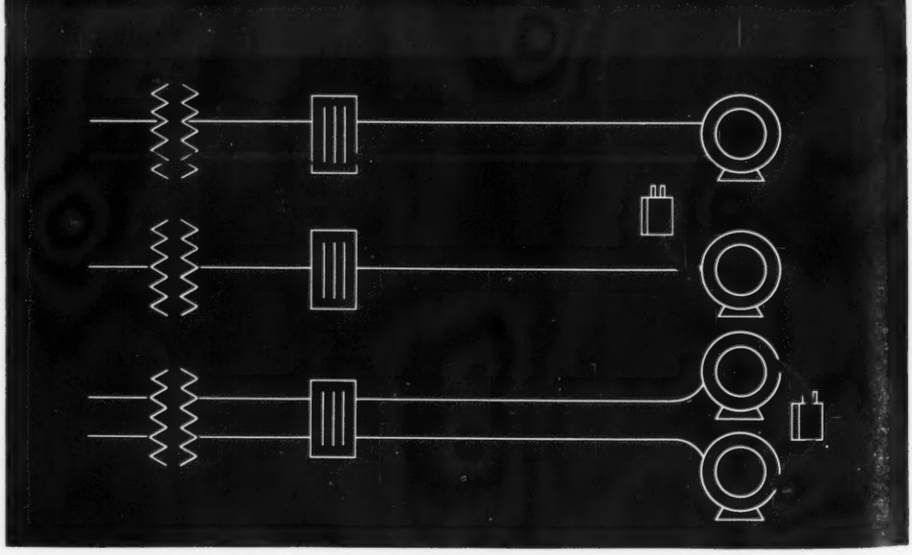
THE PROBLEM: To get more production from existing facilities.

THE SOLUTION: Installed capacitors, raising power factor from 60% to 80%.

.6 Kv-a of capacitors were required per Kw of load **(A)**.

THE RESULT: .42 Kv-a of capacity was released per Kw of load **(B)**.

No new lines were needed to provide this "power for victory."



Induction motors draw two kinds of current.

•

Capacitors neutralize "out-of-phase" amperes relieving wiring, transformer, switching equipment and generators.

•

Result: More capacity for war production!

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

power losses

ADD KV-A FOR VICTORY

Westinghouse capacitors provide the perfect answer to today's need for "Making the Most of What We've Got."

By installing capacitors on existing power lines, we can:

1. Secure additional productive capacity from existing lines.
2. Save critical materials required for the construction of new lines.

One-third to ⅔ Kv-a of load-carrying capacity is released by every capacitor Kv-a installed . . . lighting and motor performance is improved . . . dangers incident to overloaded systems are eliminated.

J-90471

For facts about capacitors and information on other methods of saving critical materials, send for this book. It tells how to:

SAVE CRITICAL MATERIALS in selection, application and use of electrical equipment.

USE NEW METHODS developed by Westinghouse to speed war production.

KEEP EQUIPMENT RUNNING through proper maintenance and repair service.

REPLACE CRITICAL MATERIALS with Micarta and Prestite.

SAVE SCRAP by systematic salvage.

WESTINGHOUSE

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PA., DEPT. 7-N

Cool light means efficient light

● There is a reason why cool fluorescent light is the most efficient practical light known. It's simply because a fluorescent lamp transforms electrical energy into more light and with less heat than other light sources.

For fluorescent light production involves an electro-chemical process rather than a heat process. That is, ultraviolet radiation of a precise wave length causes the fluorescent powder coating inside the tube to emit light, rather than heat energy in the form of invisible infrared radiation.

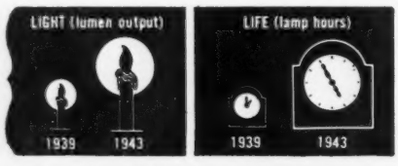
And there is a reason why Sylvania Fluorescent Lamps are as coolly efficient as modern research can make them. Sylvania engineers have drawn on years of specialized and basic experience with incandescent lamps, radio tubes, ultraviolet lamps and other electronic devices. Their aggressive and independent research has helped to make fluorescent a "must" for precision war production, and the best lighting for your home when Victory is won.

Sylvania's tireless research makes continued and consistent improvement possible. For more output, longer life and uniform color – specify Sylvania Fluorescent Lamps in authorized new installations and replacements.

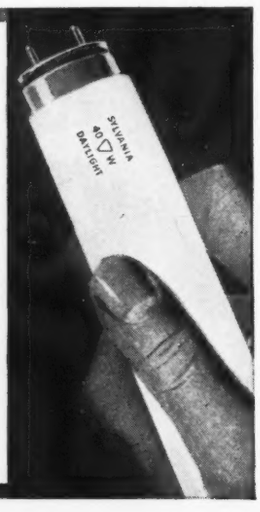
SELL SYLVANIA AND GIVE YOUR CUSTOMERS FAR MORE LIGHT AND LIFE FOR THEIR MONEY

Compared with 1939 a dollar invested today in Sylvania Fluorescent Lamps buys more than four times the lumen output and approximately five times the lamp life.

SYLVANIA FLUORESCENT DOLLAR BUYS:



(Based on decreasing price and increasing efficiency and durability of Sylvania 40-Watt White Fluorescent Lamp)



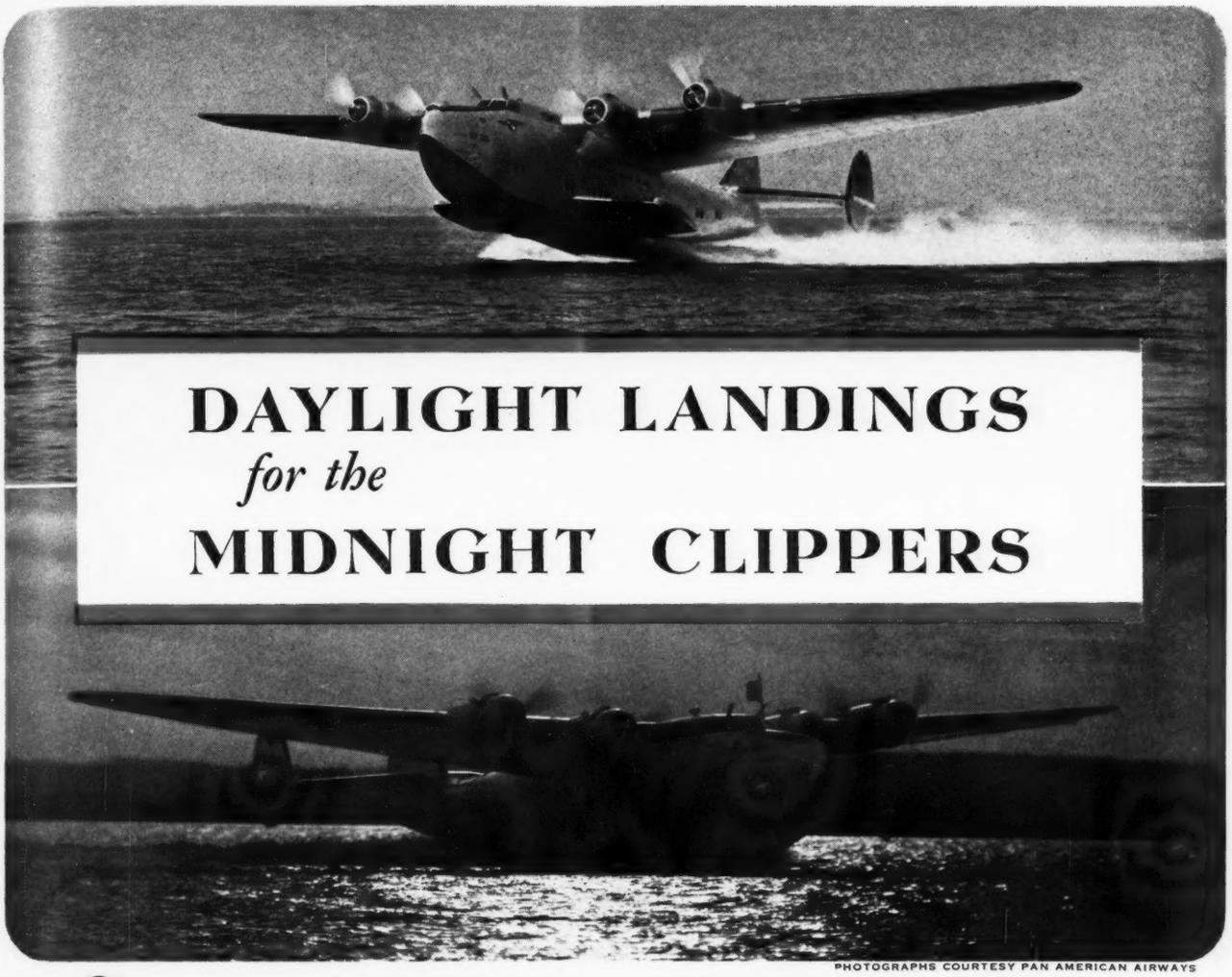
SYLVANIA

ELECTRIC PRODUCTS INC.

Formerly Hygrade Sylvania Corporation

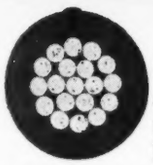
Salem, Mass.

INCANDESCENT LAMPS, FLUORESCENT LAMPS, FIXTURES AND ACCESSORIES, RADIO TUBES, ELECTRONIC DEVICES.



DAYLIGHT LANDINGS *for the* MIDNIGHT CLIPPERS

PHOTOGRAPHS COURTESY PAN AMERICAN AIRWAYS

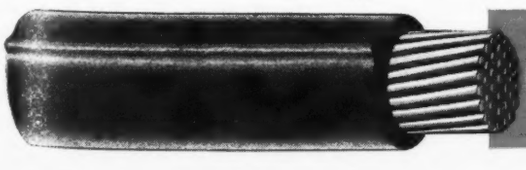


From the Golden Gate to the China Sea, peace-time passengers of Pan American Airways marvelled to see night turn into day for the after-dark landings of the Trans-Pacific Clippers. In Honolulu, Midway, Wake, Guam and Manila, the electrical communications and flood beacons, searchlights and landing lights used dependable Okosheath cables for an unfailing supply of power. What is happening now at these storied stepping stones across the world's mightiest oceans and where their Clippers now fly is clothed in military secrecy. Clippers and Okosheath alike, you may be sure, are on clock-around duty wherever America needs them most.

Okosheath is a tough, long-lived rubber compound, closely resembling a solid truck tire in its strength and wear-resisting features, and serves both as an insulation and protective covering. It resists moisture, chemicals, heat and rough handling. It eliminates the necessity for lead or other metal coverings and their common troubles such as induced sheath losses, electrolysis, corrosion, crystallization and the lack of flexibility. The rugged Okosheath non-metallic sheath eliminates complicated fibrous coverings or metal tapes which make splicing a tedious, time-consuming job, requiring expert workmanship.

Okosheath cannot at present be supplied because of its high rubber content, but it will again be available after the war, with improvements. However, Okonite's many years of continuous research have produced other cable insulations — developed from synthetics and plastics — that are today replacing scarce and even unobtainable war materials. Some of them must remain closely guarded secrets for the duration, but others are already proving of immense value to American industry! If you have a cable problem—Okonite can help you solve it.

THE OKONITE COMPANY
Passaic, New Jersey
Offices in principal cities

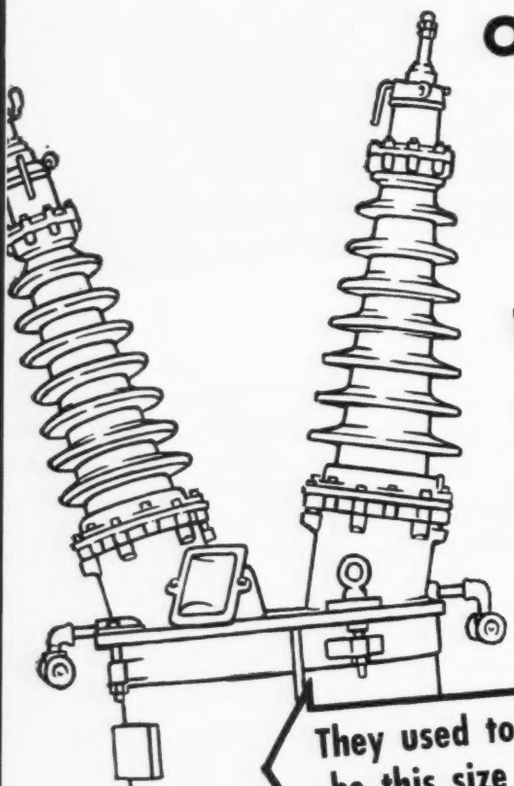


OKONITE OKONITE **Insulated Wires and Cables**

1216

For the First Time

A COMPLETE LINE OF SMALL-SIZE OUTDOOR INSTRUMENT TRANSFORMERS



They used to be this size

Type E-116
69 kv

HERE ARE YOUR *NEW* SMALL-SIZE TWO-BUSHING POTENTIAL TRANSFORMERS

Now they're this size

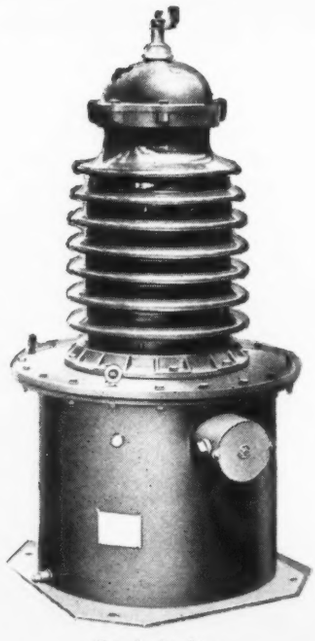
Type E-236
24 to 69 kv

69 kv

108 in.	Height	55 1/2 in.
26 1/4 in.	Width of base	28 1/2 in.
125 gal	Liquid volume	20 gal
2400 lb	Net weight	1000 lb

AND HERE ARE THE COMPANION SMALL-SIZE G-E TRANSFORMERS THAT WERE ALREADY AVAILABLE

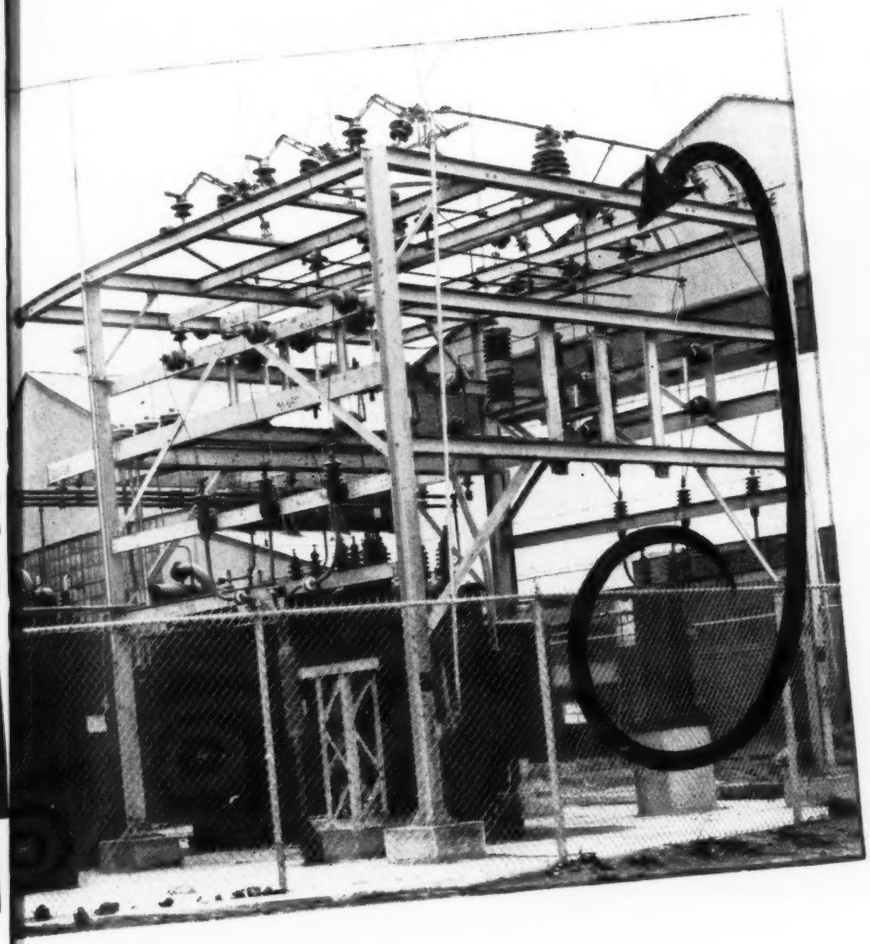
Current transformers



Single-bushing potential transformers

Now You Can Mount Them All up in the Structure

and get these advantages



SAVE SPACE

The small size and light weight of these G-E transformers make it possible to mount them up in the structure and save valuable ground space.

SIMPLIFY CONNECTIONS

Mounting in the structure simplifies primary (high-voltage) connections.

New structures can be designed to take full advantage of the small size and light weight of these units, and transformers can be installed in existent structures without building a separate foundation. You don't need to consider the testing or inspecting of the insulating liquid, because it is sealed in—thus reducing maintenance.

CHARACTERISTICS

Both accuracy and insulation characteristics have been maintained in spite of the reduction in size and weight.

ACCURACY—These transformers meet the highest accuracy classification, and are suitable for either metering or relaying.

Current transformers . . . . . ¼X, ¼Y, ¼ Z
Single-bushing potential transformers . . ¼W, ¼X, ¼Y, ¼Z
Two-bushing potential transformers. . . ¼W, ¼X, ¼Y, ¼Z

INSULATION—Ample insulation is provided to meet the ASA standards on both impulse and low-frequency tests.

FOR THE "LAST OUNCE" OF PROTECTION SPECIFY PYRANOL*

You can order these transformers filled with either Pyranol or oil. BUT, because instrument transformers are such a vital link in the protection of your system, you'll undoubtedly want Pyranol—the G-E insulating and cooling liquid which is chemically stable. It means greater safety, too. It is noninflammable.

*Reg. U.S. Pat. Off.

YOU'LL FIND IT IN THE G-E LINE

In addition to these outdoor units, General Electric makes a complete line of indoor current and potential types, and portables. You can adopt G-E instrument transformers as standard for your system.

If you'd like information about a specific type of transformer, we'll be glad to send you complete data. If you'd like to discuss the application of these transformers to a specific metering or relaying job, the meter specialist in the nearest G-E office will be glad to work with you. *General Electric, Schenectady, N. Y.*

The Army-Navy "E", for Excellence in the manufacture of war equipment, now flies over six G-E plants employing 100,000 men and women.

GENERAL ELECTRIC

604-10-6400

1¼ MINUTES READING TIME

OSMOPLASTIC

PROTECTS YOUR POLES FROM GROUNDLINE DECAY

Here's How:

1 Dig earth from around pole to a depth of about 14 inches from groundline. Then remove loose decayed wood in the treatable zone.

2 Apply OSMOPLASTIC by brushing or daubing on the cleaned surface from 6 inches above to 12 inches below the groundline level.

3 Wrap Osmose bandage around treated area. This protects and retains the Osmoplastic until the Osmosalts penetrate into pole.

4 Back-fill the hole and the operation is completed. The Osmoplastic protection adds many extra years service to standing poles.

Osmose Wood Preserving Company of America, Inc. Dept. C
1437 Bailey Avenue, Buffalo, N. Y.

Please send me the new Osmoplastic Bulletin on groundline treating utility poles for *extra* years of service life.

Name_____

Address_____

City and State_____

OSMOSE
WOOD PRESERVING COMPANY of AMERICA, Inc.
DENVER
SEATTLE • BUFFALO • SAN FRANCISCO

PRODUCTS

that are news

Testing Kit (500)

Westinghouse Electric & Mfg. Co. has announced a portable kit for testing relays and electrical operation of 125/216-volt secondary network protectors. This kit was designed by the manufacturer for routine testing in the field. Variable currents and variable voltage for relay testing and mechanism operation are obtained by means of fixed resistors, a transformer and a variable autotransformer designed for smooth, continuous voltage control.

Equipment includes voltmeters to check line voltage, relay phasing voltage and operating mechanism test voltages; ammeters to check the relay reverse current; switches to alter all circuits necessary to test the master relay, phasing relay and operating mechanism for closing and tripping; red and green indicating lights to show "close" and "trip" positions of relay contacts; fuses to protect the supply circuit, variable autotransformer and the low-range ammeter; supply and test leads. The equipment is contained in a plywood and fiber portable case.

Plug-in Condenser (501)

Sprague Specialties Co. has developed a "plug-in" type dry electrolytic condenser, which it recommends for elimination of low frequency ripple. According to the manufacturer, this condenser can be sealed as well as any condenser and is easy to mount or remove; will operate efficiently under adverse temperature and climatic conditions. It is claimed to perform uniformly up to the last volt on the rating and to take repeated surges even higher.

Lighting Transformer (502)

Acme Electric & Mfg. Co. has announced a cold cathode lighting transformer for industrial applications. This unit has a capacity of 120 miliamperes in 3 000, 4,000, 6,000, 9,000, 12,000 or 15,000-volt secondaries, the announcement states. It is claimed to be a heavy-duty unit, vibration proof and with standard conduit box for primary connection and built-in parallel electrode housings for direct connection of cold cathode tubes.

Metal Coating (503)

A coating for metal products which it states is virtually priority-free has been announced by the Chicago Vitreous Enamel Product Co. Called Armor-Vit, the finish is essentially an alkali alumina silicate with a type of oil-bearing halloysite, according to the announcement. It is claimed that metals treated with the coating have withstood weatherometer tests equal to five years.

Voltage Tester (504)

A voltage tester which reads like a thermometer is being manufactured by the Superior Instruments Co. It is claimed that when the needle-pointed test rods are connected across an electric line, the instrument automatically indicates voltage, frequency, type of current, etc. Weight 5 oz.; measurements 1¾ x 5 x 1⅝ in.

The 8200 Series

For all generally used ground wire cables.

This drop forged trunnion type ground wire suspension clamp combines strength and adequate cable-supporting length with lightness and smooth contact surface. The integrally forged U-Bolt Keeper on which the supporting bail is factory assembled results in a minimum of loose parts and simplicity of field application.

Why not get the full story on BTC clamps. Your copy of our Hi-Line reference book on request.

Through Your Insulator Manufacturer Only

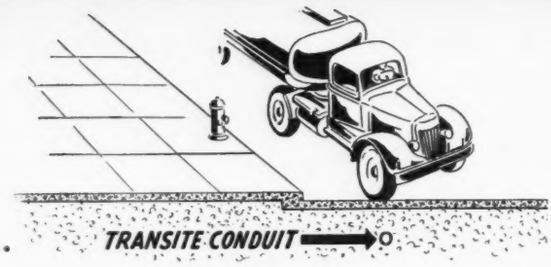
BTC

Drop Forged Hi-Line Hardware

THE BREWER-TITCHENER CORPORATION
CORTLAND, NEW YORK

WHY *TWO TYPES* OF *TRANSITE DUCTS?*

For Use Without a Protective Envelope . . .



Transite Conduit saves on labor and material, for it is so strong it needs no protective casing. It maintains its strength and true form under heavy earth loads and traffic pressure. Can't rot . . . effectively resists soil corrosion, smoke and fumes.

For Use With a Protective Casing . . .

Transite Korduct is thinner walled, lower priced, otherwise identical with Transite Conduit. Its long lengths mean fewer joints, fewer spacers. And its unusually high rate of heat dissipation lowers cable operating temperatures, boosts system capacity.

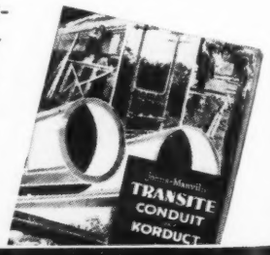
BOTH THESE DUCTS PROVIDE THESE ADVANTAGES AS WELL . . .

1. Minimize fire hazard—Transite Ducts cannot burn because they are made of asbestos and cement. They will not contribute to the formation of explosive or combustible gases.

2. Eliminate electrolysis problem—Inorganic and non-metallic, Transite Ducts can never be affected by electrolytic action.

3. Make cable pulls easy—The smooth bore of Transite Ducts speeds up cable installation. Because the ducts stay smooth in service, cables can be removed and replaced at any time with virtually no damage to sheathing.

4. Save time on installation—Light in weight, supplied in long lengths, Transite Ducts are so easy to assemble that the minimum of time and expense is required for any job. Write for Data Book DS-410, Johns-Manville at Los Angeles, San Francisco or Seattle.



JM PRODUCTS

Johns-Manville

TRANSITE DUCTS

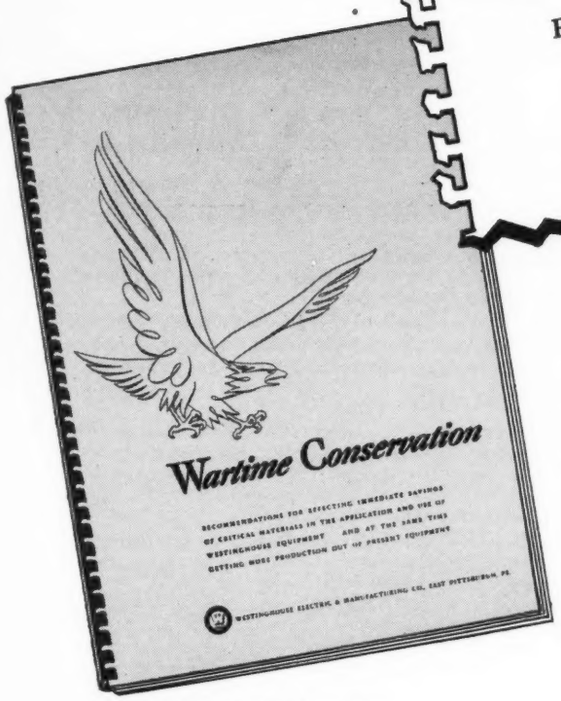
TRANSITE KORDUCT— for installation in concrete

TRANSITE CONDUIT— for exposed work and installation underground without a concrete encasement

APPLY "Selective Service" TO YOUR TRANSFORMERS FOR WARTIME CONSERVATION

Recommendation: **Present Transformers**

4. Relocate transformers to secure maximum benefits of capacity and positive protection.



This book tells how to:

- **SAVE CRITICAL MATERIALS** in the selection, application and use of electrical equipment.
- **USE NEWLY DEVELOPED METHODS** to speed vital war production.
- **KEEP EQUIPMENT RUNNING** by proper Maintenance and Repair Service.
- **SAVE SCRAP** by systematic planning and salvage.

Selective Service puts available man power to work at the jobs for which it is best fitted.

The same principle can be used on transformers. They can be relocated to secure the maximum benefits of capacity and positive protection.

This can be accomplished by:

- Moving CSP (Westinghouse completely self-protecting) transformers to locations where lightning is most severe and load is subject to extreme fluctuations. These transformers cannot be damaged by lightning, short circuits, or overloads.
- Shifting conventional transformers to areas where lightning hazards are negligible, and load is comparatively steady.

By this and many other practical measures suggested in the Westinghouse Conservation Strategy, you can save Critical Materials. Write today for your free copy of this 100-page book, B-3206. Help conserve copper, steel, and other materials for direct war use. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N. J-90480

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

18 War Production Men report what happened *when lighting was improved*

GREATER ACCURACY

SHELL FUSE manufacturer: Production increases of from 25 to 50 per cent as result of better inspection and more efficient machine operation.

MOTOR TRUCK manufacturer: Workmen read micrometers and scales more accurately.

TEXTILE manufacturer: Better Lighting a great aid in color matching.

LESS SPOILAGE

ROLLER BEARING manufacturer: Grinder operators spot improper grinder performance more quickly and can correct it before work is spoiled.

ELECTRICAL EQUIPMENT manufacturer: Better lighting accompanied by five per cent reduction in errors.

FACTORY OFFICE: Reduction in office errors as result of lighting.

FASTER SEEING

HEAVY MACHINE TOOL BUILDER: Better lighting reduces time required to rebuild a machine.

ELECTRICAL EQUIPMENT manufacturer: Time required for machine set-ups reduced.

AIRCRAFT PARTS manufacturer: Less time lost by workmen hunting for tools.

EASIER SEEING

LAMP manufacturer: Time for training new women operators greatly reduced.

SMALL MACHINE PARTS: Men can read scales and blueprints more easily at night than by daylight.

FACTORY OFFICE staff: Unable to keep up with increased work under old lighting, but now work is done without undue effort.

INCREASED SAFETY

ORDNANCE PLANT: Increased safety, especially when breaking in new labor.

SHIP BUILDER: New lighting reduced blinding effect of flashes from welding torches.

TEXTILE manufacturer: Decreased fire-hazard.

DECREASED FATIGUE

MACHINE PARTS manufacturer: Men on night shift gained weight.

AIRPLANE PARTS manufacturer: Morale improved; fewer yard fights.

AIRPLANE PARTS manufacturer: Fewer headaches; aspirin tablet consumption decreased from 1000 to 600 tablets per month.

What are you doing?

The 18 comments summarized on this page are typical of the wide range of benefits resulting from lighting improvements.

They are typical of the kind of results lighting men can and are getting when they check up on war plant lighting and suggest simple changes to correct lighting bottlenecks—changes that require a minimum use of critical materials.

To date these lighting men—the representatives of electric service companies, electrical wholesalers, and contractors, lighting equipment manufacturers—have barely scratched the surface of this job that's so important to the war effort.

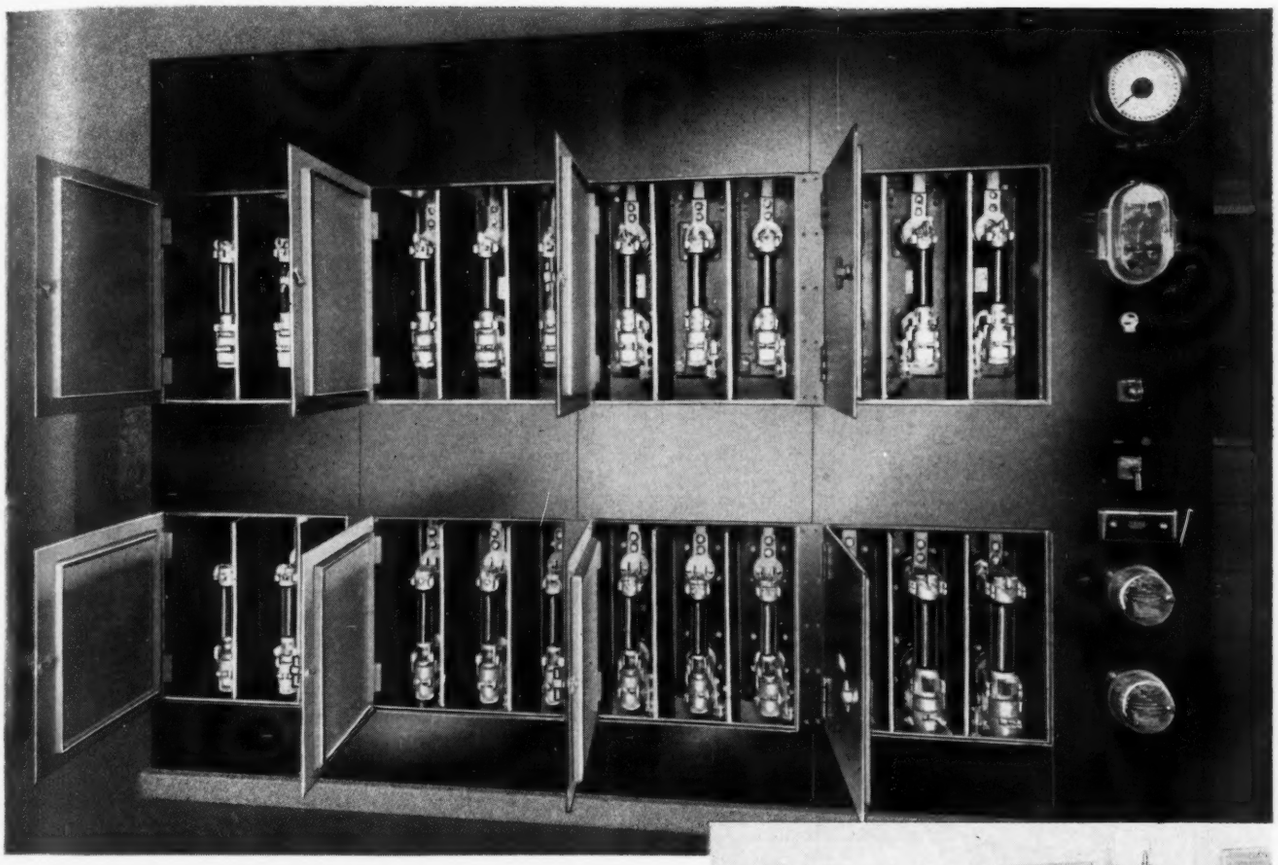
What are you doing in your own territory, for example, to help newly converted war plants and shops speed production with better light?

General Electric Company, Nela Park, Cleveland, O.

* *These reports are the result of a survey of war plants made under the direction of a special committee of the Illuminating Engineering Society, a non-profit professional organization of the nation's leading lighting authorities. Interviews were made by teachers of illuminating engineering of five leading technical colleges.*

G-E MAZDA LAMPS

GENERAL ELECTRIC



STATION AUXILIARIES PROTECTION—

At Lower Cost!

● The designing engineers of this plant decided on *fuse* protection for feeders to boiler feed pumps, coal handling equipment and other motor-driven station auxiliaries,—S & C protection with Type "SM" Fuses for the eight, three-phase 2300 volt circuits.

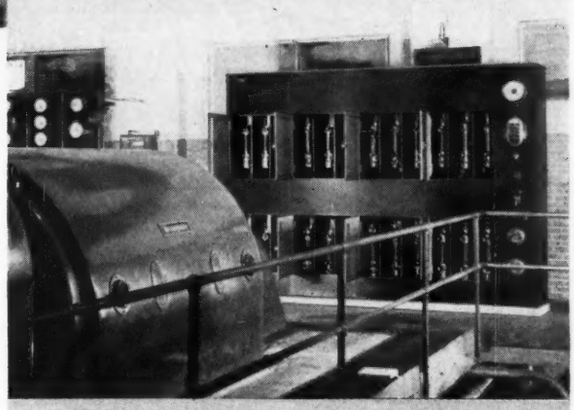
Use of S & C Type "SM" Fuses provided a compact, space-saving installation—low in initial cost and maintenance. No load switching is required, the motors being controlled at their respective locations.

These Fuses are rated from 1 to 400 amperes, with short circuit interrupting ratings up to 1,000,000 KVA. They are made for indoor or outdoor service for use on 2300/4000, 6600, 13,200, 22,000 and 33,000 volt circuits.

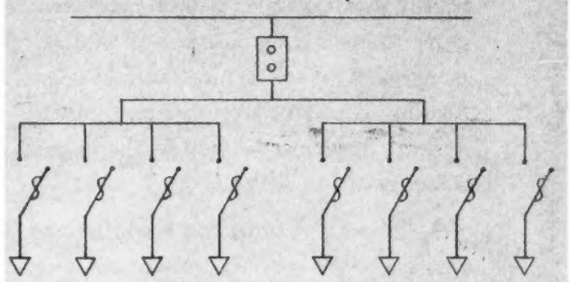
S & C engineers will be glad to assist in the selection of proper protection on your projected work.

SCHWEITZER & CONRAD, INC.
4435 Ravenswood Ave., Chicago, Illinois
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ont.

TYPE "SM"
HIGH INTERRUPTING CAPACITY
FUSES



S&C 7500V Fuses in cubicle protecting 8 three-phase 2300V circuits for station auxiliaries. Doors open to show Fuses—Cubicle built by G and N Engineering Co.



Station Auxiliary Equipment bus,—2300 Volt three-phase circuits to Station Auxiliary Drives

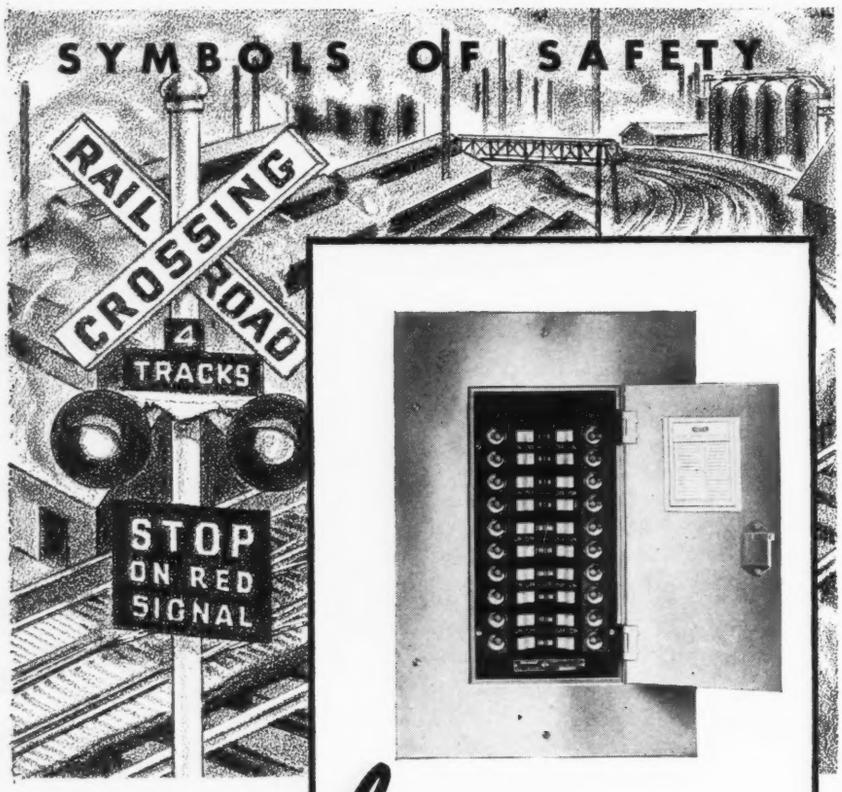
SHORT CIRCUIT-INTERRUPTING RATINGS IN R.M.S. AMPERES

Fuse Voltage Rating →	7,500	7,500	15,000	23,000	34,500
Circuit Voltage →	2,300/4,000	6,600	13,200	22,000	33,000
**SMPC-4	17,500	15,000	12,500	10,000	7,500
SMP-4	27,500	25,000	20,000	15,000	10,000
**SMPC-5	30,000	25,000	20,000	17,500	15,000
SMP-5	40,000	35,000	30,000	25,000	20,000

**Equipped with Condenser

WESTERN REPRESENTATIVES:

SAN FRANCISCO
George E. Honn, 420 Market Street
LOS ANGELES
Farnham & Cunningham, Edison Bldg.
SEATTLE
T. S. Wood, 220 Ninth Avenue, North
SALT LAKE CITY
Riter Engineering Co., Kearns Bldg.



Federal PANELBOARD SAFETY FACTORS

INCREASE WAR PRODUCTION

Controlled, continuous lighting is essential for increased war production. That's why Federal panelboards are built with special safety features to insure perfect control and protection of lighting and small power circuits.

The rugged construction of Federal's low cost NTPR panelboards, for example, assures permanent alignment of working parts to reduce the danger of short circuiting. But there are many other safety features, such as—switch ahead of every fuse, floating contacts, large wiring gutters. This is true of *all* Federal Panelboards. Follow the leaders—for extra service and safety switch to Federal!

For Complete Panelboard Data

write for catalog 42. Contains all the essential facts on Federal NTPR and Mastertype panelboards.

SAN FRANCISCO 1264 Folsom Street UNderhill 2367-8
PORTLAND, ORE. 121 N. W. Fifth Ave. ATwater 5355 BEacon 4380
LOS ANGELES 440 Seaton Street MUtual 7087

FEDERAL ELECTRIC PRODUCTS COMPANY
64 PARIS STREET NEWARK, N. J.

PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES • CIRCUIT BREAKERS

Frequency Meters (505)

New models of its Telrad line of radionic frequency meters have been announced by the Fred E. Garner Co. According to the manufacturer, all models are crystal-controlled and, by means of a class C harmonic amplifier circuit, accurate frequency carrier signals are provided every 10 and 100 kc. from 100 cycles to 45 megacycles. A carrier signal also is produced every 1,000 kc. from 1 to 120 megacycles. A panel-mounted "on-off" switch permits use of a 1,000-cycle modulated note. Models available for either a-c or portable battery operation.

Waterproofing Agent (506)

A method of waterproofing by exposing materials to chemical vapors from a new compound has been developed by General Electric Co. A clear liquid composed of various chemicals which vaporize at a temperature below 100°C., Dri-Film forms an "invisible raincoat" on cloth, paper and other materials, according to the manufacturer, who states that one of its most important uses to date is the treatment of ceramic insulators for radio equipment.

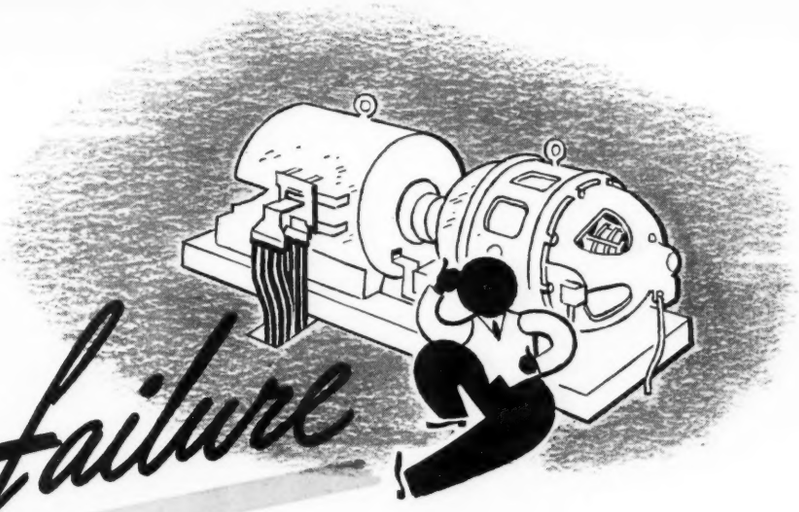
Fume Exhauster (507)

Chelsea Fan & Blower Co. has developed a fume exhauster with a centrifugal-type blower wheel made of ⅛ in. thickness of steel. It is stated that the 3-hp. motor is tested to an overload capacity to meet rough usages. Adapters are interchangeable and can be used for suction or blowing, according to the manufacturer.

Stripping Medium (508)

Sterling Varnish Co. has developed a stripping medium which it claims provides fast and easy removal of insulating varnish from portions of electrical equipment. This stripper is a blue viscous liquid which is brushed on machined surfaces or other metal parts prior to actual application of

the varnish to the piece as a whole. It dries in two or three minutes, the manufacturer states, and the varnish is then applied in the usual manner. When varnish treatments are finished, any varnish which has adhered to the portions previously treated with the stripper can be removed with a wood or bakelite knife without marring or otherwise disturbing the exact and close tolerances, according to the manufacturer.



Friday's failure

MAKES GUN MOUNTS ON TUESDAY

FRIDAY THE THIRTEENTH, 9:00 A.M., ARMATURE FAILED IN 1500 AMP. MULTIPLE-OPERATOR WELDER. LOST PRODUCTION FOR 15 MEN. WELDER DELIVERED TO WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT. NEW COILS FORMED, INSULATED AND TREATED. ARMATURE REWOUND. NEW EQUALIZER MADE AND INSTALLED. TURNED AND POLISHED COMMUTATOR. TUESDAY, THE SEVENTEENTH, 8:00 A.M., BACK ON THE JOB TO MAKE GUN MOUNTS FOR SMACKING THE AXIS.

Westinghouse

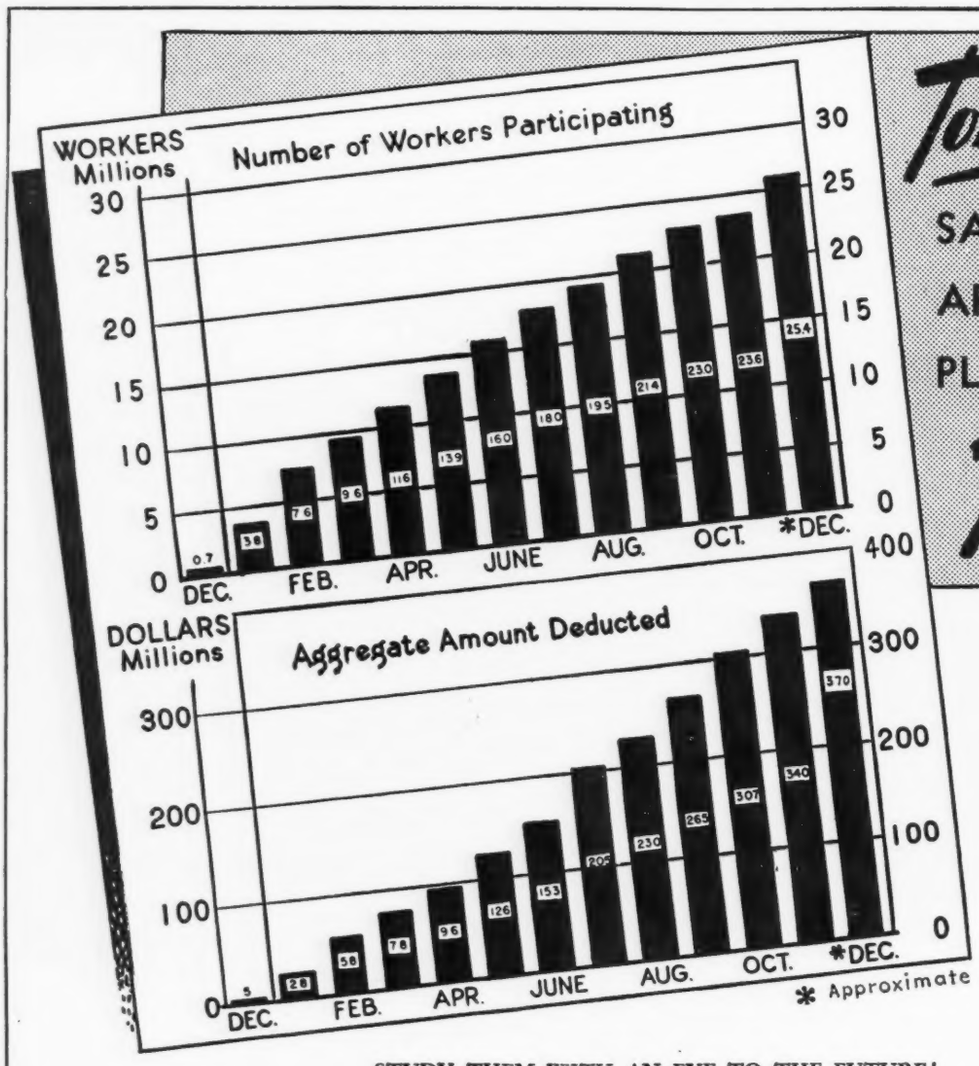
DISTRICT MANUFACTURING AND REPAIR

J-90463

IF **THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!



Tomorrow's SALES CURVES ARE BEING PLOTTED . . . Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS (*Members of Armed Forces Included Starting August 1942*)

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—*and mountains of brand new consumer goods tomorrow.* Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns $4 for every $3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory —*and tomorrow's sales curves*—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with War Savings Bonds

This space is a contribution to America's all-out war effort by

ELECTRICAL WEST

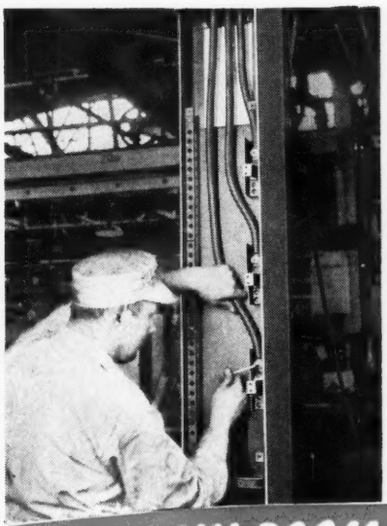
U. S. GOVERNMENT PRINTING OFFICE 505500

HOW TO DO 4 HOURS WORK IN 3

BullDog
Narrow Column Circuit Breaker Panels —a Quick Windup to Wiring Jobs

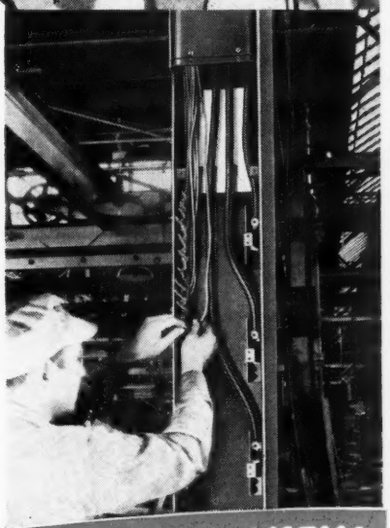
1-ONE MAN JOB

Light, compact pieces—no heavy or complicated parts that take more than one man's time to install.



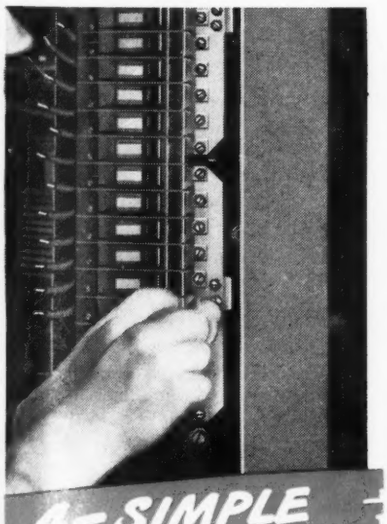
2-ELBOW ROOM

Wireman not slowed by having to work in narrow "side" gutters as cables are pulled and connected.



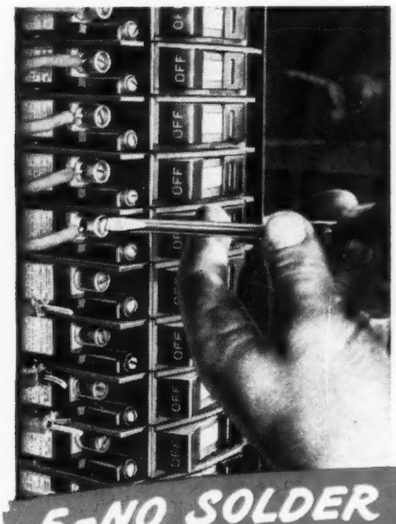
3-CLEAR VIEW

Work is faster, surer, as branch circuit wires are led to retainers — no groping or guesswork.



4-SIMPLE

Major wiring job done in an empty cabinet—panel is set and connections made to main cables.



5-NO SOLDER

Branch wires are readily inserted and tightened in the Solderless Wire Grips.

Now is the time when plants *must* cut every corner, to save precious maintenance time. BullDog's Narrow Column Panels meet industry's wartime need for speed of installation and ease of upkeep. Write for complete bulletin No. 426, covering various types of BullDog time and money-saving equipment.

BULLDOG
ELECTRIC PRODUCTS CO.
DETROIT, MICHIGAN
BullDog Electric Products of Canada, Ltd.
Toronto, Ontario
Field Engineering Offices in All Principal Cities

MANUFACTURERS OF Vacu-Break Safety Switches, SafToFuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems — FOR LIGHT AND POWER.

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

FOR RURAL EXTENSIONS

Specify Crapo STEEL CONDUCTOR!

TIME-TESTED *Crapo* Steel Conductors are "made to order" for the rural extensions authorized by these high-strength steel WPB's Supplementary Utilities Order U-1-c. For conductors, with their superior 60-cycle alternating-current properties, have proved their efficiency, dependability and economy in rural service all over the country for the last seven years.

Crapo HTC-130 Steel Conductor, in the No. 6 B.W.G. Stranded (3-wire) type adopted for these extensions, is available through Graybar Electric Company, Inc., Distributors. Ask the Graybar representative or contact the nearest Graybar branch office!

WRITE FOR NEW ENGINEERING MANUAL containing complete technical information on *Crapo* Steel Conductors, including electrical characteristics and performance, sag and tension data and applicable construction practices! Address:

INDIANA STEEL & WIRE COMPANY
MUNCIE, - - INDIANA

Crapo HTC-130 STEEL CONDUCTORS

Lighting Ballast (509)

General Electric has developed a three-lamp, 40-watt, high power factor ballast for fluorescent lighting of industrial plants. The new unit was designed to eliminate necessity for two ballasts—one Tulamp 40-watt and one single-lamp high power factor 40-watt—with the three-lamp fixture. It is said to be better adapted to installation in a fixture than two separate ballasts and to reduce the amount of wiring required for connections.

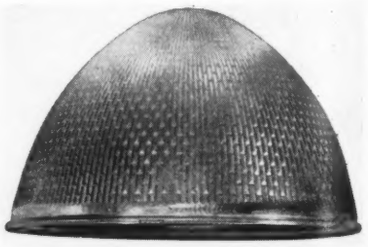
The three-lamp ballasts are designed to operate on lighting circuits of 110-125, 199-216, 220-250 and 240-280 volts. Power factor is 90% or above.

Reflectors (510)

Two "Victory" reflectors made of non-critical material have been announced by the Bright Light Reflector Co. These Silv-A-King units are said to be made of a lightweight, sturdy composition which resists heat, moisture and corrosion. Reflecting surface is finished with a baked white enamel that is claimed to be comparable in lighting efficiency and reflectivity to porcelain enamel and to meet RLM requirements. Available for either chain or rigid suspension in two or three-lamp, 40-watt unit and a two-lamp 100-watt unit.

Street Lighting Globe (511)

Westinghouse Electric & Mfg. Co. has developed a smooth surface globe which it claims reduces street lighting maintenance. The inside of the globe is finished with a uniform pattern of rectilinear configurations, through which light rays are diffused horizontally. The smooth outside surface is said to retard collection of dust and dirt.



According to the manufacturer, the new globe is of pressed construction to secure more uniform pattern and light distribution. Available in two types—long and short.

Bushings (512)

A new line of Pinco dry-type equipment bushings for use on voltages from 7.5 kv. up to and including 25 kv. has been announced by the Porcelain Insulator Corp. For use with currents up to 400 amp., flanges are of galvanized electric furnace-annealed malleable iron; for services above 400 amp. flanges are of bronze. Other types furnished on special request. Available in either draw lead or fixed type terminals.

We waited 4 Years to make this *Announcement*

★ ★ ★

EARLY IN 1938, Shell Scientists and engineers, after long tedious months of experimenting, were ready to give a new turbine oil its supreme test. Exhaustive laboratory analyses had shown it possessed properties previously thought unattainable by even the most optimistic turbine manufacturers.

But Shell men were not satisfied. "How will this new turbine oil stand up under actual operating conditions?" was the question they wanted answered.

There was but one way to find out . . . test it in turbines. They did. After a 2-year run, samples taken showed every characteristic of the original oil. Further checking was done . . . other tests were made. It still looked "as good as new."

Then, and only then, was the new Shell Turbo Oil announced. That was in January 1941. Even then many operators were doubtful that Shell Turbo Oil was as good as we claimed. "It hasn't been in use long enough," they said.

Today Shell Turbo Oil is able to show a performance record that should convince the most skeptical. For after more than 30,000 hours of operation in a power company's turbine, Shell Turbo Oil tests as well as the day it was put in over 4 years ago. To the original filling of 4,400 gallons only 300 gallons of make-up oil have been added. Certified chemical analyses of samples taken from the turbine show no signs of deterioration on any score.

30,000 hours of operation, in itself, is no record for a turbine oil. But 30,000 hours *without a single sign of structural breakdown* is a record in which every turbine operator should be interested. It is but one of scores of records being set by the new Shell Turbo Oil in all types of turbines.

Here is proof positive that the new Shell Turbo Oil has *the two most important* characteristics necessary to the proper lubrication of modern turbines:

SUPERIOR OXIDATION STABILITY
RUST PREVENTION

Ask the Shell man for the details today!

(Currently, the U. S. Navy has first call on Shell's entire production of marine turbine oil.)

Shell Turbo Oil

SHELL

1 See that all terminals are securely fastened to the brush holder support.

2 Remove dirt and grit from brush holders.

3 Provide 1/8" to 3/16" clearance between commutator and nearest portion of brush support in reaction and box type brush holders. Less clearance is sometimes preferable on small motors.

4 Keep angular position of all brush holders uniform with respect to the commutator.

5 Check neutral point and space the brush arms equidistant about the commutator.

6 See that toes of all brushes on each arm are parallel with commutator segment.

7 To prevent streaking of commutator, stagger brushes in positive and negative pairs.

8 Seat new brushes on commutators and rings accurately with sandpaper or a brush seating stone.

9 Adjust brush spring pressure to conform with manufacturer's recommendation.

Use This Check List

WHEN INSTALLING BRUSHES ON YOUR ELECTRICAL EQUIPMENT

Care exercised in the installation, fitting and adjustment of brushes increases life, improves performance and eliminates many of the possible causes of interrupted service.

NATIONAL TRADE-MARK *Carbon, Graphite and Metal-Graphite* BRUSHES

"National" brushes are doing their full share of carrying the enormous load demanded by the Nation's war effort. Essential requirements must be met first. Every effort is being made to satisfy all demands for our brushes in the shortest possible time.

Proper maintenance is paramount in keeping your electrical equipment operating at full efficiency. Many valuable and time saving suggestions as well as details of operations mentioned in the above check list are included in this series of "Modern Pyramids" bulletins. Copies are available promptly upon request.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

CARBON SALES DIVISION, CLEVELAND, OHIO

General Offices: 30 East 42nd St., New York, N. Y.

Branch Sales Offices: New York, Pittsburgh, Chicago, St. Louis, San Francisco

LETS GO! U.S.A. KEEP 'EM FLYING!

THE WORD "NATIONAL" AND THE SYMBOL ARE REGISTERED TRADE-MARKS OF NATIONAL CARBON COMPANY, INC.

"COLD" or "hot" and loaded!

OPEN CIRCUITS SAFELY . . . UNDER LOAD WITH NEW WESTINGHOUSE LOAD-BREAK DISCONNECTS

It makes no difference whether the circuit is under load or not—you can open it SAFELY with the new Westinghouse Load-Break Disconnect Switch!

This makes possible greater system flexibility with less switching equipment. It provides inexpensive isolating of primary feeders and sectionalizing of transformer banks . . . UNDER LOAD . . . SAFELY.

The LCB can be opened under load because arcing is confined to a small auxiliary blade and the arc is quenched almost instantly in a "De-ionizing" chamber.

For complete information, call your Westinghouse Office or write for B-3203, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-60520

RATINGS

System Voltage	Switch Rating Continuous		Interrupting Rating
	Amperes	Volts	Amperes
2,400 4,160	400	5,000	400
6,900	200	7,500	200
13,800	100	15,000	100

HOW IT WORKS: Main blade opens first, leaving auxiliary blade engaged. At a predetermined position, auxiliary blade is snapped open by spring action. Arc is extinguished in "De-ion" chamber.

- For safe, nonautomatic switching.
- For sectionalizing primary feeders.
- For isolating transformer banks, capacitors, voltage regulators, and similar applications.
- For circuit interruption and protection when combined with BA "De-ion" power fuses.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

DISCONNECT SWITCHES

STARTS JUNE 1ST Another Series of

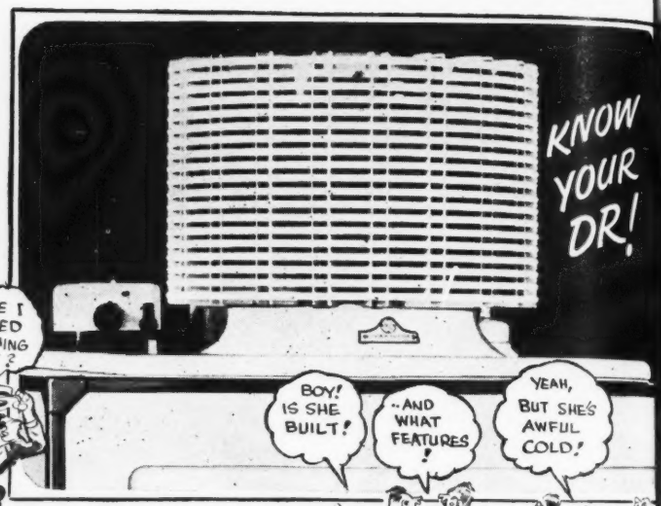
GENERAL ELECTRIC FIELD SCHOOLS featuring REFRIGERATION

PLUS A COMPLETE WARTIME SERVICE PROGRAM

THROUGH THESE PORTALS PASS THE WORLDS BEST INFORMED SERVICE MEN

STEP RIGHT

A GREAT ARRAY OF TO YOUR WARTIME

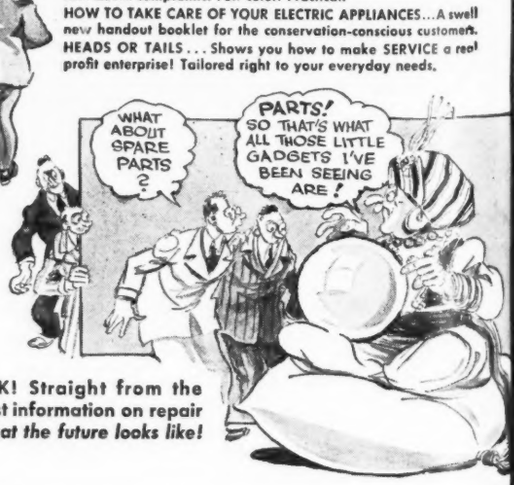


MOVIES! Finest professional talent! The DR machine in the stellar role. New, up-to-the-minute repair methods and techniques.

DON'T BLAME IT ON THE OVEN . . . A liberal education that cuts down complaints. Full color. Practical.
HOW TO TAKE CARE OF YOUR ELECTRIC APPLIANCES...A swell new handout booklet for the conservation-conscious customers.
HEADS OR TAILS . . . Shows you how to make SERVICE a real profit enterprise! Tailored right to your everyday needs.

"HOW TO REPAIR GENERAL ELECTRIC IRONS"

An *exclusive* new film. Talk about timing! Just when the need is greatest. Uncle Sam says, "Iron Repair Very Essential."

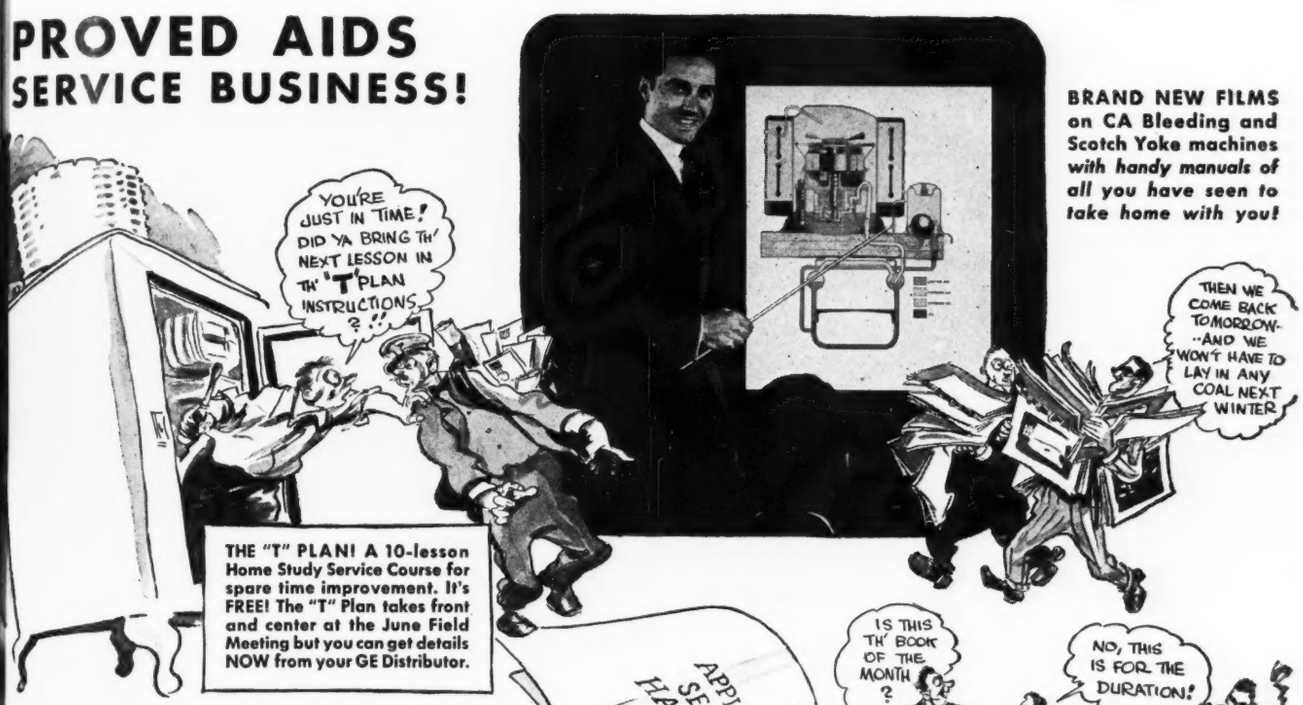


PARTS TALK! Straight from the crystal! Latest information on repair parts *and what the future looks like!*

WAR BONDS WILL BUILD AND EQUIP NEW VICTORY HOMES

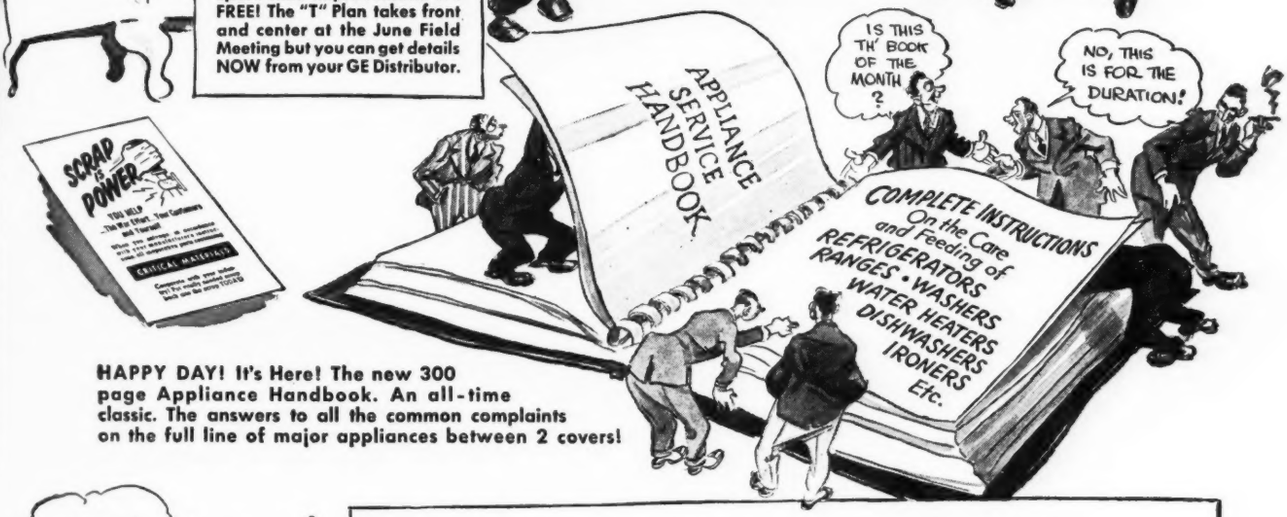
T IN AND TAKE A CHAIR!

OF PROVED AIDS ME SERVICE BUSINESS!


YOU'RE JUST IN TIME! DID YA BRING TH' NEXT LESSON IN TH' 'T' PLAN INSTRUCTIONS ?!!
THEN WE COME BACK TOMORROW-- AND WE WON'T HAVE TO LAY IN ANY COAL NEXT WINTER

BRAND NEW FILMS on CA Bleeding and Scotch Yoke machines *with handy manuals of all you have seen to take home with you!*

THE "T" PLAN! A 10-lesson Home Study Service Course for spare time improvement. It's FREE! The "T" Plan takes front and center at the June Field Meeting but you can get details NOW from your GE Distributor.


SCRAP IS POWER
APPLIANCE SERVICE HANDBOOK
IS THIS TH' BOOK OF THE MONTH ?
NO, THIS IS FOR THE DURATION!
COMPLETE INSTRUCTIONS On the Care and Feeding of REFRIGERATORS RANGES • WASHERS WATER HEATERS DISHWASHERS IRONERS Etc.

HAPPY DAY! It's Here! The new 300 page Appliance Handbook. An all-time classic. The answers to all the common complaints on the full line of major appliances between 2 covers!

CHECK THIS LIST FOR THE NEXT G-E SERVICE TRAINING MEETING IN YOUR CITY
(If city near you is not listed, check your G-E Distributor)

Allentown, Pa.	Fayetteville, N. C.	Massillon, Ohio	Rockford, Ill.
Altoona, Pa.	Findlay, Ohio	Maysville, Ky.	Saginaw, Mich.
Appleton, Wisc.	Flagstaff, Ariz.	Memphis, Tenn.	Salisbury, Md.
Ashland, Ky.	Fort Wayne, Ind.	Middlesboro, Ky.	San Bernardino, Cal.
Ashland, Ohio	Grand Rapids, Mich.	Milwaukee, Wisc.	Santa Barbara, Cal.
Atlanta, Ga.	Hagerstown, Md.	Minneapolis, Minn.	San Diego, Cal.
Atlantic City, N. J.	Harrington, Del.	Morganton, N. C.	Scranton, Pa.
Binghamton, N. Y.	Harrisburg, Pa.	Muncie, Ind.	Sioux City, Iowa
Bluefield, W. Va.	Indianapolis, Ind.	Nashville, Tenn.	Sioux Falls, S. Dak.
Cape Girardeau, Mo.	Jefferson City, Mo.	Omaha, Neb.	South Bend, Ind.
Charleston, W. Va.	Joplin, Mo.	Oxford, Ohio	Springfield, Ill.
Chattanooga, Tenn.	Kansas City, Mo.	Paducah, Ky.	St. Louis, Mo.
Chicago, Ill.	Knoxville, Tenn.	Peoria, Ill.	St. Paul, Minn.
Columbus, Ohio	La Crosse, Wisc.	Philadelphia, Pa.	Syracuse, N. Y.
Davenport, Iowa	Lancaster, Pa.	Phoenix Ariz.	Tampa, Fla.
Dayton, Ohio	Lawrenceburg, Ind.	Pittsburgh, Pa.	Terre Haute, Ind.
Denver, Colo.	Lexington, Ky.	Pueblo, Colo.	Toledo, Ohio
Des Moines, Iowa	Long Island City, N. Y.	Queensboro, N. C.	Tucson, Ariz.
Dubuque, Iowa	Los Angeles, Cal.	Quincy, Ill.	Waterloo, Iowa
Duluth, Minn.	Louisville, Ky.	Raleigh, N. C.	West Orange, N. J.
Evansville, Ind.	Madison, Wisc.	Reading, Pa.	Wichita, Kan.
Fargo, N. Dak.	Mason City, Iowa	Rochester, N. Y.	Wilmington, Del.

Ask your General Electric Appliance Distributor for Meeting Dates and Reservation for Yourself and Service Staff.

GENERAL ELECTRIC

TOMORROW!

RE-LIGHTING

the new **manpower / production** *requirement*

OPERATION STUDY SHEET

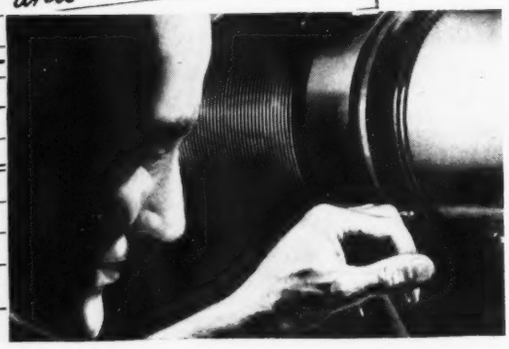
Working Conditions *Poor light, caused by improperly located lamps. Heavy shadows on work area confuse and slow up worker... considerable spoilage--accident hazard.*

Machine No. *349*

Capacity

Size

Department



Vital to reduce rejects, increase production

Operation study sheets all too often record "poor light" as a major cause of poor quality production—of too many units that cannot pass inspection. This condition is particularly noticeable on night-shift work because—

Most plants operating today were designed and built for peacetime, *daylight* working schedules. Wartime production demands night work; and *lighting based on daylight conditions is inadequate to serve the needs of night workers.*

The answer to this problem is *re-lighting.* You can quickly, easily, and with little expense increase the efficiency of your present lighting equipment by re-locating lamps to eliminate glare and shadow, increasing lamp wattages where necessary, or installing additional equipment to insure uniform lighting levels throughout your plant. A Silv-A-King lighting engineer can tell you exactly what is necessary.

Silv-A-King has specialized in industrial lighting for 22 years. Silv-A-King quality equipment (fluorescent or incandescent) plus a Silv-A-King "engineered layout" makes an unbeatable combination.

BRIGHT LIGHT REFLECTOR COMPANY, INC.
312 Morgan Avenue, Brooklyn, N.Y.

Send for your copy of our 16-page book: "Light Is An Essential Production Tool"

SILV-A-KING
MAKES *Light* WORK FOR YOU

BROILKING AFTER THE WAR, MORE THAN EVER *America's Finest Electric Table Broiler*
INTERNATIONAL APPLIANCE CORPORATION
1027 Metropolitan Avenue, Brooklyn, N. Y.

Electric Drill (513)

A new model ¼-in. heavy duty portable electric drill has been announced by Skilsaw, Inc. Designed especially for "skin-drilling" in airplane construction, the manufacturer claims that the new model is adaptable for many production drilling jobs up to ¼-in. in steel and ½-in. in wood. Weight 3½ lb.; length 7¼ in.; width 2-9/16 in. Universal motor available in four speeds—1,800, 2,500, 3,500 and 5,000 rpm.

Double Throw Switch (514)

Delta-Star Electric Co. has developed a double throw 23-kv., 600-amp. switch which it states has a positive lock at the switch blade hinge end to prevent operation of double throw disconnects from one to the other position without coming to a full stop in the open position. These switches can be furnished in all standard voltage and ampere ratings, the manufacturer reports.

Conduit Bender (515)

A thin wall conduit bender with improved gravity and foot release hook has been announced by Lew Fittings Co. This bender is marked with numerals for forming 90° elbows to desired measurements. Available in combinations of ½ and ¾ in. and ¾ and 1 in.

Plastic Drill Housing (516)

Electric drills with plastic housings have been announced by Black & Decker. The plastic is made with a shredded cotton duck base, which is said to give a high impact resistance, to withstand considerable abuse and wear, and to be heat-resistant. Available with ¼ and ⅜ in. standard drills with either end handle or side handle control; Universal motors operating on either a-c or d-c.

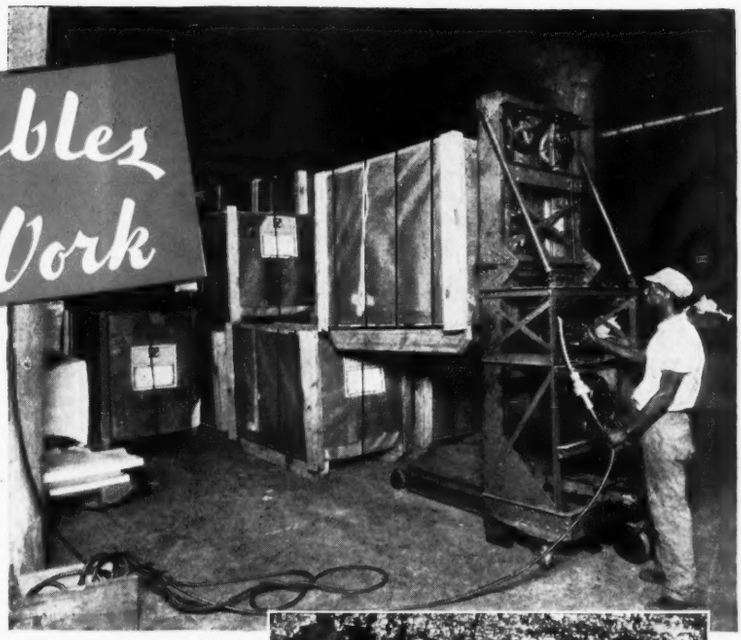
Percentage Timer (517)

R. W. Cramer Co. has developed a percentage timer, which automatically controls the percentage of time at which any a-c circuit can periodically be closed or opened out of a definite length of time cycle. These timers are available for seven different time ranges from 30 sec. to 60 min. total cycle. The single pole, single throw contact is rated at 10 amp. at 115 volt or 5 amp.

Electric Motors (518)

Robbins & Myers, Inc., has announced a new line of Uni-Shell electric motors. According to the manufacturer, motor types in any one frame size are interchangeable, having identical shell dimensions, head fit, bolt circle holes, shaft size and conduit box mountings.

Trailing Cables FOR Vital WAR Work



TIREX - rubber sheathed - cables were designed for hard, rough work. They still have remarkable wearing qualities and abrasion resistance and can be depended upon for continuous, dependable performance but, for the duration of the war, they meet restrictions governing the use of rubber, copper and other scarce materials.

It is important, now more than ever before, to get maximum service from trailing cables upon which portable or mobile electrical equipment depends for current. New cables are hard to get and those already in service must be used until they are completely worn out. To this end we make four suggestions.

1. As far as possible use the proper size and type of cable for the work to be done.
2. Provide extra protection or change location where exposure is hazardous.
3. Inspect cables frequently and regularly to discover conditions that may cause trouble.
4. Make repairs promptly when needed.

If you must have new cables for vital war work we shall be pleased to do anything we can, consistent with conservation restrictions, to help you get what you need.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

ARMY E NAVY

Simplex

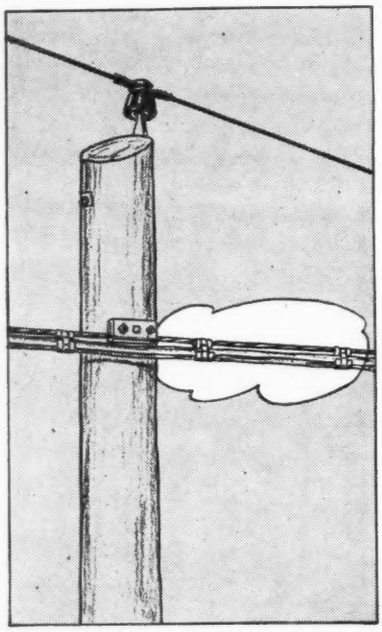
WIRES and CABLES

390 Fourth St.
San Francisco, Calif.

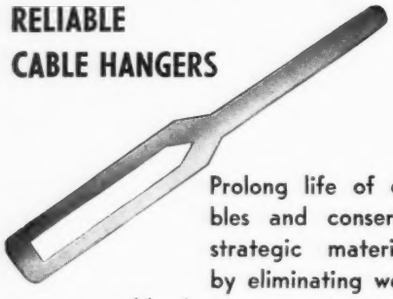
PACIFIC COAST OFFICES
910 East Third St.,
Los Angeles, Calif.

503 Polson Bldg.
Seattle, Wash.

Reduce Outages
Avoid Cable Wear
Reduce Maintenance



RELIABLE CABLE HANGERS

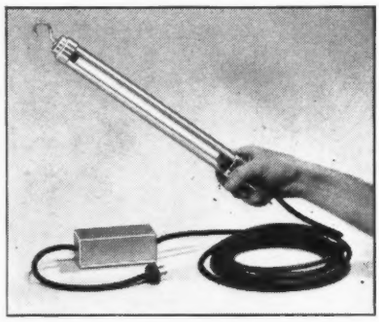


Prolong life of cables and conserve strategic materials by eliminating wear on cable sheaths or on insulation of hand made cables. Reliable cable hangers hold cable and messenger together tightly with wide bearing surfaces which eliminate snaking and chafing. They are easily applied and make installations that are permanent and very neat

Reliable ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

Inspection Light (519)

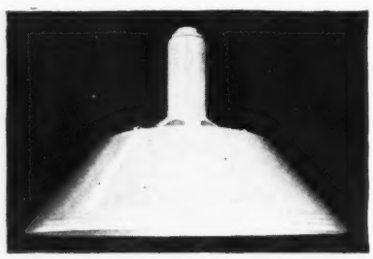
A fluorescent inspection light designed to meet war industry requirements has been announced by Commercial Reflector and Mfg. Co. According to the manufacturer,



the light is easily taken apart for lamp replacement. A combination metal light baffle and support shields light from the operator's eyes. Standard cord plug and ballast box with 20 ft. of cord supplied. A protecting tube of Lucite eliminates danger of breakage. Shown is type FI-8P for eight-watt fluorescent lamp.

Industrial Reflector (520)

F. W. Wakefield Brass Co. has designed a new line of industrial lighting reflectors using a Plaskon reflecting medium which is said to have a natural translucency. It is claimed that light is allowed upward to illuminate the ceiling area by use of this reflector and by piercings in the deflector,



which is an extension of the husk. According to the manufacturer, 11% of the lumens of the bare lamp are directed toward the 90° to 180° zone and 75% of the lumens are directed downward, making a total light output of 86%. Available in 15 and 19 in. reflectors for lamps from 200 to 500 watts. Only 13 oz. of critical material is used in each of these units, the manufacturer claims.

F-Lighting Unit (521)

Mitchell Mfg. Co. has designed a fluorescent lighting unit requiring less steel and available in four models. Included are two and three-light units using 40-watt lamps, a two-light unit using 100-watt lamps and a two-section unit for four 100-watt lamps, which operates with one ballast. All models can be used for individual or continuous row mounting.

Fuses (522)

A weather-protected intermediate duty boric acid fuse which interrupts the circuit to faulted equipment and isolates the fault from the feeders with a complete 180° air break has been designed by Westinghouse Electric & Mfg. Co. for outdoor power systems.

The blow fuse unit is dropped out of the circuit after the fault current is interrupted, and, according to the manufacturer, there is no possibility of burning contacts or arcing between fuse tube and clips or of any carbonized fuse parts breaking down to produce leakage or a second fault.

Available in voltage ratings from 7.5 through 69 kv.

Glass Insulators (523)

Corning Glass Works has a new line of electrical insulators developed by a Multiform process which it claims makes glass available for insulation in a wide variety of shapes, sizes and designs. According to the manufacturer the process involves a combination of cold-molding batch materials and subsequent fusing. The finished ware is opaque but a true glass, it is explained. Multiform glassware can be made from almost any glass composition, the choice depending upon qualities required, it is stated.

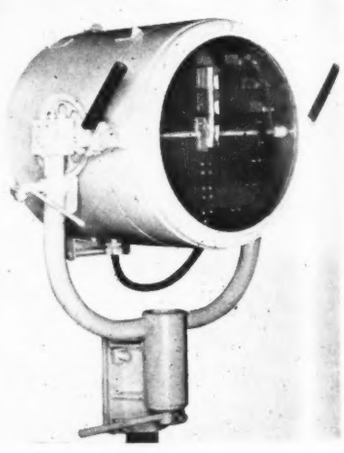
Synchronous Control (524)

General Electric Co. has announced a new electronic half-cycle synchronous control for precise operation of resistance-welding machines. This control is furnished in two types—one which includes a welding transformer and is designed for bench mounting and one without a transformer designed for wall mounting.

The unit is said to feature a new tube which is easily replaced; a new circuit for higher-speed welding; a simplified initiating circuit; and heat control by the phase-shift method.

Signalling Searchlight (525)

A 12-in. signalling searchlight with an all-welded construction designed to withstand shipboard vibrations and sudden shock has been designed by General Electric Co. This unit is made of bonderized steel and has a Marine gray finish over rust-resistant zinc chromate primer. The shutter, which can be operated from either side of the drum, has been tested to withstand more than two million operations at the rate of 180 operations per minute, the manufacturer states. Reflector is a standard silvered-glass searchlight type, with a specially treated backing. Supporting trunnion arms are heavy steel tubing.



WESTINGHOUSE
ELECTRIC & MANUFACTURING COMPANY

246 EAST FOURTH ST.
MANSFIELD, OHIO

May 3, 1943

POSTWAR PLANNING
WITH BOTH FEET
ON THE GROUND

When peace comes and the postwar planning you're hearing so much about now can be expressed in actual products -- what will you, as an electrical merchant, be most interested in?

First, we believe, you will want a line of products which you can get for actual selling -- fast!

It's all right to talk about new plastic refrigerators and glass ranges -- but if you have to wait for months before you can get such products, you're not going to play many tunes on your cash register meanwhile!

Second, you will want products that have acceptance. Neither you nor your customers will want to experiment with new and untried products and materials, no matter how novel and glamorous.

You can probably think of several well advertised products that didn't "take"
T. J. N.

So we think postwar planning in your interest means our getting into production fast -- getting you a line of products you know will give customer satisfaction -- products that give you low selling cost, low service cost with quick turnover and profits.

To be sure, we have our share of new and revolutionary designs for ranges, refrigerators and whatnot -- and we're as far advanced with them as any patriotic manufacturer should be who is 100 per cent in the war effort.

How well you know it, too!
T. J. N.

But -- we have been in this business a long time, and we know that nobody can introduce new and revolutionary things without bugs. And bugs mean delays in getting onto the market, service expense to dealers, disappointment to customers.

So we submit that wise postwar planning in your interest should prompt us to go through two stages:

1. Get into production fast on essentially those products you have sold before -- improve, but

(over)

don't experiment then with radical changes.

2. Bring along the revolutionary new developments as quickly as they can be "proved."

You're going to hear a lot about the new appliances that are coming, postwar. You're going to be told to wait for them. You're going to be told that everything you sold in the past will be obsoleted by what's coming. And that's so -- eventually.

By arrived I mean more than "produced" I mean proved out salewise T.J.N.

All we can say is that products that are "coming" ring no cash registers until they arrive. Rushing into them may mean expense to you. We all know that the products you sold in the past gave mighty good customer satisfaction and performance. And with the huge postwar demand, what is more sensible than to give the public good, proven products -- pronto!

We hope you will agree with this outline of our thinking. We call it "Postwar planning with both feet on the ground."

Of course, there may be some radical new products in the immediate postwar period as a result of new manufacturers who haven't any time-tried prewar designs.

But we (and certain other manufacturers like us) have an experience in this business -- an experience that involves a lot of "know-how" in appliance engineering, manufacturing, and in working with and making money for dealers.

We mean G.E. Frigidaire, Kelvinator and some others T.J.N.

And we know that postwar success involves far more than merely postwar products. Your future and ours is dependent upon continued CONSUMER ACCEPTANCE. That suggests there are many things we both should be doing now for later. Our program for doing these things is outlined in a little book entitled "Your Future and Ours" which I am sending you. I should appreciate your reading it carefully and letting me have your reactions.

If you didn't get your copy please write me T.J.N.

Sincerely,

T. J. Newcomb.

T. J. Newcomb, Sales Manager
Electric Appliance Division

BULLETINS

data books, etc.

Manpower (526)

"Refrigeration Service Manpower Problems and Suggested Procedure for Meeting Them" is the title of a pocket-size booklet being distributed to refrigerator retailers by Nash-Kelvinator Corp. This publication includes information on government regulations covering wages, selling price ceilings for labor charges, mechanic manpower, selective service and other phases of manpower.

Lathe Maintenance (527)

A booklet on lathe maintenance has been prepared by South Bend Lathe Works. Included are data on testing motors and power supply; shortening, splicing and adjusting belts; testing and adjusting spindle bearings; and adjusting dovetail gibs. Illustrated.

Farm Equipment Care (528)

General Electric has published a four-page leaflet, "How to Keep Farm Electric Equipment On Its Toes," giving tips on maintenance and care of motors, wiring, lighting, electric brooders, milking machines, refrigeration equipment and pumps.

Controllers (529)

The Bristol Co. has published an eight-page bulletin describing its line of convertible free-vane air-operated controllers. This bulletin contains data on the five types of controllers offered and information on converting from one type to another.

Wartime Engineering (530)

In place of its annual review of progress in electrical engineering and apparatus, Westinghouse Electric & Mfg. Co. has published a 32-page booklet entitled, "Wartime Engineering," and dealing with technical problems presented to the company. Illustrated.

Crane Operation (531)

Electric Controller & Mfg. Co. has issued a booklet titled "How to Operate a Crane." It is designed to aid in training inexperienced personnel, including women. The 48-page booklet is illustrated with drawings and photographs.

F-Lighting Units (532)

Day-Brite Lighting, Inc., has issued a data sheet on its new line of portable units for fluorescent lamps. The line is designed for production, inspection and servicing operations and includes a range of sizes from 6 to 40 watts.

Bushings, Bearings (533)

An 84-page catalogue listing prices and sizes of finished bronze bushings and porous oil-retaining bearings has been released by Atlas Brass Foundry, Inc.

It takes TOOLS to win the war

Don't abuse them!

KLEIN TOOLS EST. 1857

Since 1857

ONE of the indications of a good workman is the way he cares for tools. Today, with the Army and Navy demanding quality tools in unheard-of quantities, there are few that can be spared for civilian needs. It is doubly important then that we make every tool we use give its full measure of service.

Most tools do not wear out. They are broken, damaged or lost long before they serve their full life. Conserving tools will add months, even years to their usefulness.

As a contribution to this tool-conservation program, we have prepared a booklet packed with suggestions on the care and safe use of tools. A copy of this booklet will be sent to anyone interested.

Handle tools carefully—treat them well. Quality tools are built to stand hard use—not abuse. Remember that a broken tool is a "break" for Hitler.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributors:
International Standard Electric Corp., New York

Write for this free booklet on the care and safe use of tools.

Mathias Klein & Sons
3200 Belmont Avenue, Chicago, Illinois
Gentlemen: Please send me without charge a copy of the booklet *"Long Life to Tools."*

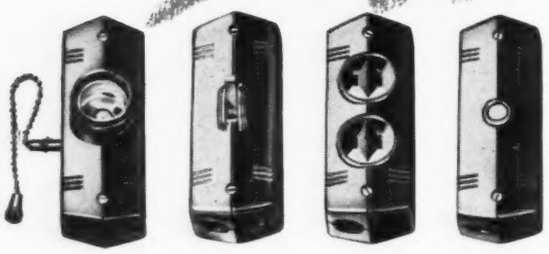
Name.....

Address.....

City.....*State*.....

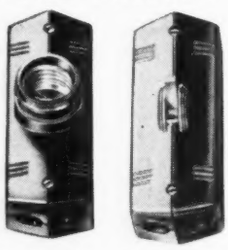
Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO

MANUFACTURERS OF LINEMEN'S AND ELECTRICIAN'S TOOLS AND EQUIPMENT



MONCOR SURFACE WIRING DEVICES

These good-looking devices are ideal for surface wiring in war housing and in war-purpose industrial buildings, warehouses, etc. Their use saves time and materials. Knockouts in the ends, sides and backs of these devices enable them to be end-connected, side-connected (knob and tube or cleat wiring) or back-connected for concealed wiring.



FOR FURTHER INFORMATION about G-E wiring devices, wires and cables and conduits, see the nearest G-E Merchandise Distributor or write to Section CDW533-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

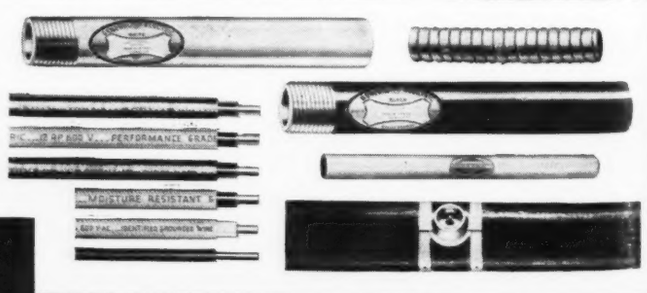
G. E. OFFERS A PRESSURE TERMINAL SWITCH TO AID WAR WIRING

Wires need no longer be looped around screws when installing 20- and 30-amp. switches. Simply insert the wire in the pressure terminal and tighten a screw. Contacts are made quickly and securely. These switches will accommodate wires as large as No. 8 solid or stranded. They are $1\frac{1}{4}$ inches deep, back wired and will fit shallow switch boxes. Arc snuffers give them a high rating.

These pressure terminal switches are made of Textolite and are totally enclosed. They have smooth, positive action and are quiet for switches of their capacity. They are listed by the familiar catalog numbers, GE2971, etc.

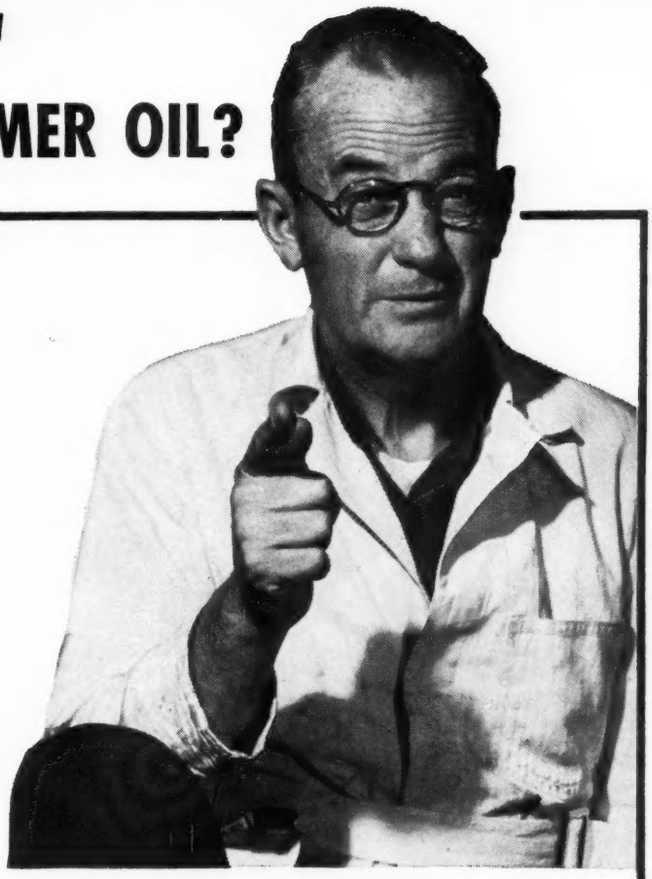
G-E CONDUITS AND BUILDING WIRES

There are G-E conduits and building wires for every purpose: White and Black rigid conduits, EMT, flexible conduit, Fiberduct and six building wires including Type SN small diameter synthetic insulated.

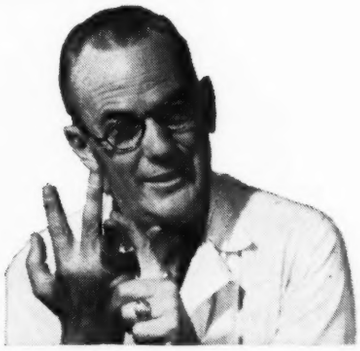


GENERAL ELECTRIC

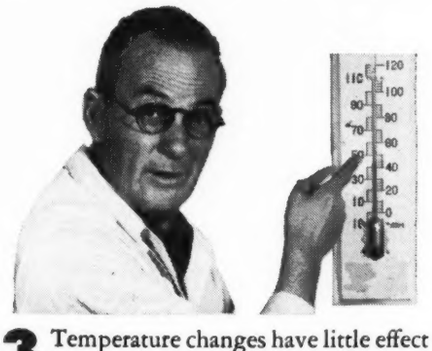
Ever Hear of a 'PATRIOTIC' TRANSFORMER OIL?



1 A patriotic person is a guy who gets in there and works and fights for all he's worth. And that's exactly what Red Line Transformer Oil does. It's built to work and fight for all it's worth, to protect your transformers against the heavier loads they have to carry nowadays.



2 There are a lot of reasons why Red Line Transformer Oil can do this mighty essential job. First, it forms a minimum of sludge! It is practically free from deposits that retard transfer of heat. Second, it is absolutely free from moisture, lint, dust and other foreign particles that reduce insulation.



3 Temperature changes have little effect on Red Line Transformer Oil. Its *high flash point* minimizes evaporation losses at high temperatures. And when the mercury falls well below zero, Red Line stays *free-flowing*—a very important quality for transformers used in cold climates.

4 So before you forget it, give your Union Oil Resident Manager a ring and have him deliver a supply of Red Line Transformer Oil. You'll find that it pays to buy a 'patriotic' transformer oil built to do a wartime job.

OIL IS AMMUNITION—USE IT WISELY!

RED LINE *TRANSFORMER OIL*

UNION OIL COMPANY

TAKE THIS TIP! When you buy petroleum products, buy enough to last. It will protect you against transportation tie-ups and it will insure you of an adequate supply of the products you need.

LAST YEAR'S BONDS GOT US STARTED

THIS YEAR'S BONDS

ARE TO WIN!

★ Last year saw nearly 30,000,000 workers voluntarily buying War Bonds through some 175,000 Pay-Roll Savings Plans. And buying these War Bonds at an average rate of practically 10% of their gross pay!

This year we've got to top *all* these figures—and top them handsomely! For the swiftly accelerated purchase of War Bonds is one of the greatest services we can render to our country . . . and to our own sons . . . and our neighbors' sons. Through the mounting purchase of War Bonds we forge a more potent weapon of victory, and build stronger bulwarks for the preservation of the American way of life.

"But there's a Pay-Roll Savings Plan already running in my plant."

Sure, there is—but how long is it since *you've* done anything about it? These plans won't run without winding, any more than your watch! Check up on it today. If it doesn't show substantially more than 10% of your plant's pay-roll going into War Bonds, it needs winding!

And you're the man to wind it! Organize a vigorous drive. In just 6 days, a large airplane manufacturer increased his plant's showing from 35% of employees and 2½% of pay-roll, to 98% of employees and 12% of pay-roll. A large West Coast shipyard keeps participation jacked up to 14% of pay-roll! You can do as well, or better.

By so doing, you help your nation, you help your workers, and you also help yourself. In plant after plant, the successful working out of a Pay-Roll Savings Plan has given labor and management a common interest and a common goal. Company spirit soars. Minor misunderstandings and disputes head downward, and production swings up.

War Bonds will help us win the war, and help close the inflationary gap. And they won't stop working when victory comes! On the contrary—they will furnish a reservoir of purchasing power to help American business re-establish itself in the markets of peace. *Remember, the bond charts of today are the sales curves of tomorrow!*

You've done your bit Now do your best!

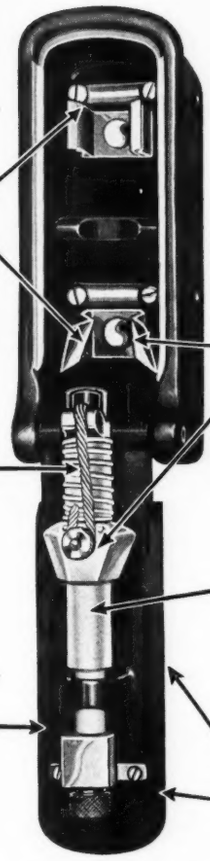
THIS SPACE IS A CONTRIBUTION TO AMERICA'S ALL-OUT WAR EFFORT BY

ELECTRICAL WEST

LOWER HEAT RISE
NO BURNED CONTACTS
SURE INDICATION

Substantially built!
Two sizes:
50 amps., 5 KV
50 amps., 7½/12½ KV

Door stays closed!
Dirt, rain, snow and ice stay out but it indicates!



Old fashioned tried and true area contacts of phosphor bronze prevent excessive heat rise.

Wedge contacts take up ⅜ inch slack if carelessly left in links, and provide recoil on shorts.

Stainless steel spring puts normal tension of less than 2½ pounds on link, therefore no over-tensioning of links.

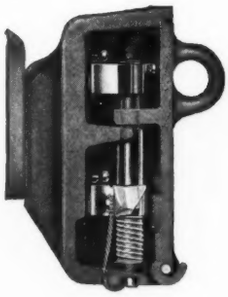
Shows fuseholder properly fused and ready to be closed in to housing. Door is easily attached in this position.

Fuseholder and door are removed or replaced as a unit. The door does not drop out.

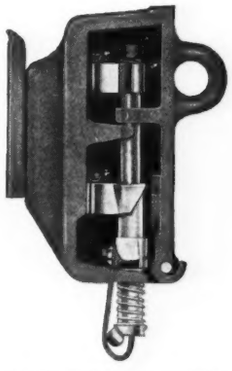
Note the clean simplicity and absence of weak or complicated parts or mechanisms.

STREAMLINED

Conserve vital metals, yet
comply with all NEMA Cutout Standards.
No other Porcelain Housed Primary
Cutouts give you as many advantages
as these time-tested Dropdown
Indicating Type Matthews Cutouts
Send for Bulletin 103
Try them at our risk.



Phantomized to show closed position ready to operate



Shows indicating position with Fuse Link separated

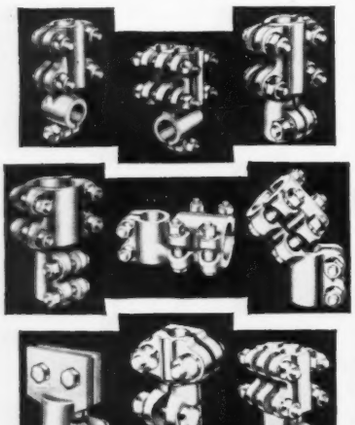
W. N. MATTHEWS CORPORATION, ST. LOUIS, U. S. A.

Engineers and Manufacturers Since 1899

"You select
EXACTLY
what you need—

— from the **COMPLETE** line"

Stud Connectors and **Solderless Terminal Adapters** for distribution and power transformers . . . for connecting to cable, pipe or bus bar . . . in line or at any angle. Connectors with reversible clamping caps take two different ranges of cable sizes. Furnished for any number of conductors. A few of Penn-Union's many types:



Also . . . the most complete line of Service Connectors, Cable Taps, Tees . . . Straight and Parallel Connectors . . . Bus Supports, Spacers . . . Grounding Clamps, Terminal Lugs, etc. etc.

F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

KENNETH ANDERSON CO.
334 East 4th St., Los Angeles

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington

Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

Plant Equipment (534)

A 50-page spiral-bound bulletin published by General Electric Co. describes the types of electric equipment that company has available for aviation-gasoline plants. The booklet is divided into three main sections—power generation, power distribution and power utilization. Turbine-generators, switchgear, load-center unit substations, cable, mechanical-drive turbines, different types of motors and controls, and cycle timers are some of the devices included in the bulletin.

Disconnect Switches (535)

A new Delta-Star publication describes and lists the company's multiple-finger, single and double-throw, outdoor form disconnect switches. Listed are capacities up to and including 1,200 amp. and voltage ratings up to and including 69 kv. Construction details, dimensions and high-pressure contact arrangements, together with types of contact lugs are shown.

Care of Tools (536)

Mathias Klein & Sons has prepared a pocket-sized booklet on the proper care of tools. Entitled "Long Life to Tools", this booklet tells how to make tools last longer and how to use them safely and efficiently. Illustrations showing correct and incorrect uses emphasize the points brought out in the text. Included are pliers, wrenches, screw drivers, rope, leather straps, climbers and other tools.

Electrical Contacts (537)

Design, manufacture and application of electrical contacts is discussed in a 36-page booklet published by Callite Tungsten Corp. This booklet covers types of contacts, physical size and shape and particular applications to which each metal and alloy is best suited. Illustrated.

Panelboards (538)

Information on panelboards and cabinets is contained in Bulletin 69, recently published by the Frank Adam Electric Co.

Fire Extinguishers (539)

Use and care of fire extinguishers is explained in a booklet recently published by American-LaFrance-Foamite Corp. Various classes of fire and types of extinguisher are treated, as are inspection, upkeep, charging, discharging and recharging. Charts give data on extinguisher and engine characteristics, methods of operation, capacity, range of stream, etc.

Voltage Regulators (540)

Allis-Chalmers Mfg. Co., has released an illustrated bulletin covering its redesigned feeder voltage regulators of the "unit construction" type. This book is illustrated with installation photographs, operational drawings and standard rating charts. One section describes the theory of step-type regulator operation.

Fittings Catalogue (541)

Lew Fittings Co. has issued a catalogue of its floor outlet boxes, receptacles and other devices and accessories.

Wartime Catalogue (542)

Blackhawk Mfg. Co. has issued a wartime hydraulic equipment catalogue listing only items scheduled for production. Elimination of all products "discontinued for the duration" will eliminate order delays, the manufacturer believes. The catalogue includes added specifications on listed items.

Motor Control (543)

General Electric Co. tells how to select and apply motor control in a 16-page manual, "Simplified Guide to the Selection and Application of Commonly Used Motor Controls." Fundamentals of control are presented in the text, which is illustrated by photographs and diagrams.

Lighting Installations (544)

American Concrete Corp., has prepared a catalogue of street and highway lighting installations. General product data, design and specifications for Hy-Lite Standards are included.

Electric Tools (545)

A 20-page pocket-sized booklet telling how to get maximum service from portable electric tools has been prepared by the Independent Pneumatic Tool Co., manufacturers of Thor tools. Included are problems in connection with the maintenance of motor, cable, switch and brushes.

ELECTRICAL WEST, 68 Post St., San Francisco, California

Please send me information about following CIRCLED items:

500	501	502	503	504	505	506	507	508	509
510	511	512	513	514	515	516	517	518	519
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540	541	542	543	544	545				

Name..... Company*..... Title*.....

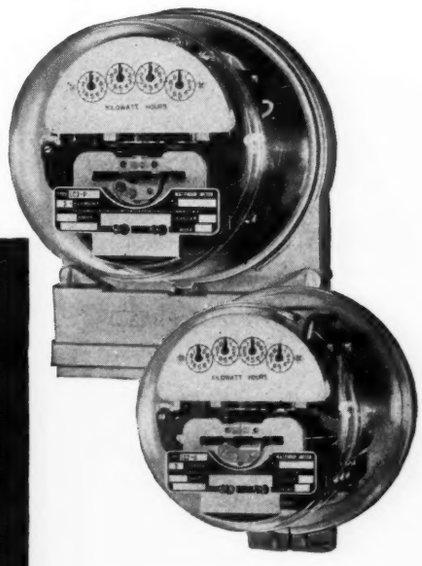
Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

WAR BONDS MAKE UNCLE SAM MORE POWER-*full*

"On Measurement is founded the whole progress of man.."

At the beginning of the twelfth century in merrie old England, where would people turn for the acme of precision? Where, but to the king himself—and so Henry I made the "yard" uniform. There was only one king, so there could only be one yard. The distance from Henry's nose to the tip of his outstretched thumb became the lawful yard. Was the king in good humor and wholly relaxed on that day? Was he measured at dawn or at eventide? No one knows! Yet, that was the conception of standardization. Compare it with today's high standard of measurement of electricity set and met by the electric utilities and the manufacturers of watt-hour meters.



NO OTHER COMMODITY IS MEASURED SO *Accurately* AS ELECTRIC POWER

● **SANGAMO ELECTRIC COMPANY** SPRINGFIELD ILLINOIS ●

Would you turn your back on a wounded Soldier?

You think you wouldn't...you don't mean to...

But unless you are giving every precious minute of your time...every ounce of strength that you can spare...towards helping win this war as a civilian, you are letting down those soldiers who are sacrificing lives to win it for you.

What you are asked to give up isn't much compared with what they're giving up. The extra work you undertake is small compared with the gigantic effort they are making. But to a wounded soldier, what you do can mean the difference between life and death.

You make the choice.

LOOK AROUND YOU! *Pick your war activity—and get into it! In your local Citizens Service Corps or Defense Council there is something for every man, woman and child to do. If no such groups exist in your community, help to organize them. Write to this magazine for free booklet, "You and the War," telling what you can do to help defeat the Axis. Find your job—and give it all you've got!*

Contributed by the Magazine Publishers of America

EVERY CIVILIAN A FIGHTER

Your friend . . . the Foot Candle

A foot candle is the illumination from one standard candle on a surface one foot from the light source.

It is the unit of measurement of illumination.

But more than this, the foot candle is man's staunch friend.

In adequate amounts it means his family will have sufficient light in the home . . . he and his fellow workers sufficient light for better, safer factory production or efficient office detail.

For almost 100 years the MILLER organization has known the foot candle on working terms. This lighting experience bridges the broad ground from the whale oil lamp to the modern continuous fluorescent lighting system now helping industry speed out planes and tanks and cannon.

It has involved engineering and design and skill with copper . . . glass . . . steel . . . aluminum and many new non-metallic materials. It has required ingenuity and resourcefulness and pioneering.

It qualifies us to work with those who need better lighting in war industry. It enables us to cooperate intelligently with those who promote better lighting and sell and service it, too. It means that the MILLER engineer (located in principal cities) can serve you in one of several ways, for better lighting today and tomorrow.

Miller Lighting

. . . for better, safer production
. . . for a more prosperous peace

THE MILLER COMPANY • MERIDEN, CONN.

Today our men and women are also busy making gauges, bomb noses, torpedo and searchlight parts, wiring devices, ship fixtures and many other precision parts for Army & Navy.

ELECTRA'S HUSBAND

"The Briefcase Brigade"

"THE American people are a long-suffering group," Electra's guest—a member of the clergy—was speaking. "They seem indecently immune to all kinds of perversions and burdens. It's shocking some times even to contemplate the mistreatment they will accept. Ultimately though, they get aroused. Then nothing can stop them. Therein lies my hope — no, my expectation, that bureaucracy in this country will be supplanted by the democratic processes of checks and balances envisioned by our forefathers."

"A good place to start is with the ration boards," Electra said. "There are some little bureaucrats who never heard of checks or balances."

"That's right," our guest continued, "They simply prove that a taste of the power which goes with public office frequently serves only to awaken an insatiable appetite for more power. Once any man becomes cloaked with public authority, the ever-present temptation is to don the regal robes of absolute dictation. So it is with the bureaucrats. But they forget that the public will only accept so much. That time is coming."

To those who might scoff at this reasoning that the public will revolt, we offer a convincing bit of proof. Up in Washington a legislative initiative giving extensive new powers to PUDs was recently voted. By giving it an emergency twist, the proponents hoped to prevent submission of the proposal to the public. However, the State Supreme Court has ruled otherwise. The law will be submitted for referendum provided a sufficient number of signatures are secured. And here is what the Tacoma *Labor Advocate*, official voice of union labor in that area, has to say about the proposition:

"Public attention is once more centering on the controversial power bill which has been kicked around in the last few months.

"More and more the whole power issue is degenerating into a sort of tug-of-war between minority pressure groups and their political stooges. More and more, organized labor is viewing the sorry spectacle with apprehension and suspicion.

"The significant thing is that the matter of 'public vs. private power' should be controversial at all. In the good old days the issue was comparatively simple. On one side was the greedy Power Trust; on the other the long-suffering and much exploited public—and fellows like us were the 'public.' It was as simple as that. And labor, naturally, was not neutral.

"But most of us have learned a lot since then. And we are still learning. One of the things that is causing organized labor to look at the matter in a different light is the rising tide of bureaucracy which is sapping the foundations of labor unionism and private enterprise alike. As long as business men were 'under the gun' labor paid little attention to the machinations of the bureaucrats.

"But when the 'Briefcase Brigade' started to move in on the labor unions, the story was different. Nor is the situation at Portland the only example. Many others might be cited to show what happens when dearly bought union conditions become all bound 'round with governmental red tape.

"In the old days working people used to think that when the horrible 'Power Trust' was knocked out of the picture that the 'public'—people like ourselves—would step in. Now we know better. Now we know that when the employer steps out, the bureaucrat steps in.

"The result is that we are as far as ever from being anything but interested spectators. And the worst of it is that we—the majority of citizens—are more at the mercy of organized minority pressure groups than ever before. And we have even less to say about things—even such important things as wages, hours and conditions — than ever before.

"Our labor unions function admirably when it comes to negotiating with private employers. But many unions have learned from bitter experience that negotiating with the 'Briefcase Brigade' is a horse of a different color.

"Organized labor has its own score to settle with the bureaucrats and its own disagreement with the minority groups that play ball with them. That is why more and more wage earners in Tacoma are insisting that the entire power issue be submitted to the people rather than be left in the hands of minority groups committed in advance to the principle of bureaucratic control.

"Many labor unionists will keep the above facts in mind when the petition to place the matter of so-called 'public power' to the voters of this state puts in an appearance. Labor unionists in Tacoma have learned a lot since the old days when they were kidded into believing that public power meant public benefit or public control.

"No doubt the petition about to be circulated will prove that labor is still alert in protecting its basic interests. We shall see."

When I commented to Electra that this certainly was a straw in the wind, she countered with the statement that it certainly was no bale of hay.

THERE were eight of us at the luncheon table—a power company purchasing agent, his chief assistant, the sales manager and a salesman for an electrical supply house (the first-mentioned two obviously were their guests), two utility engineers, a manufacturer's salesman and Electra's lesser half. The purchasing agent spoke.

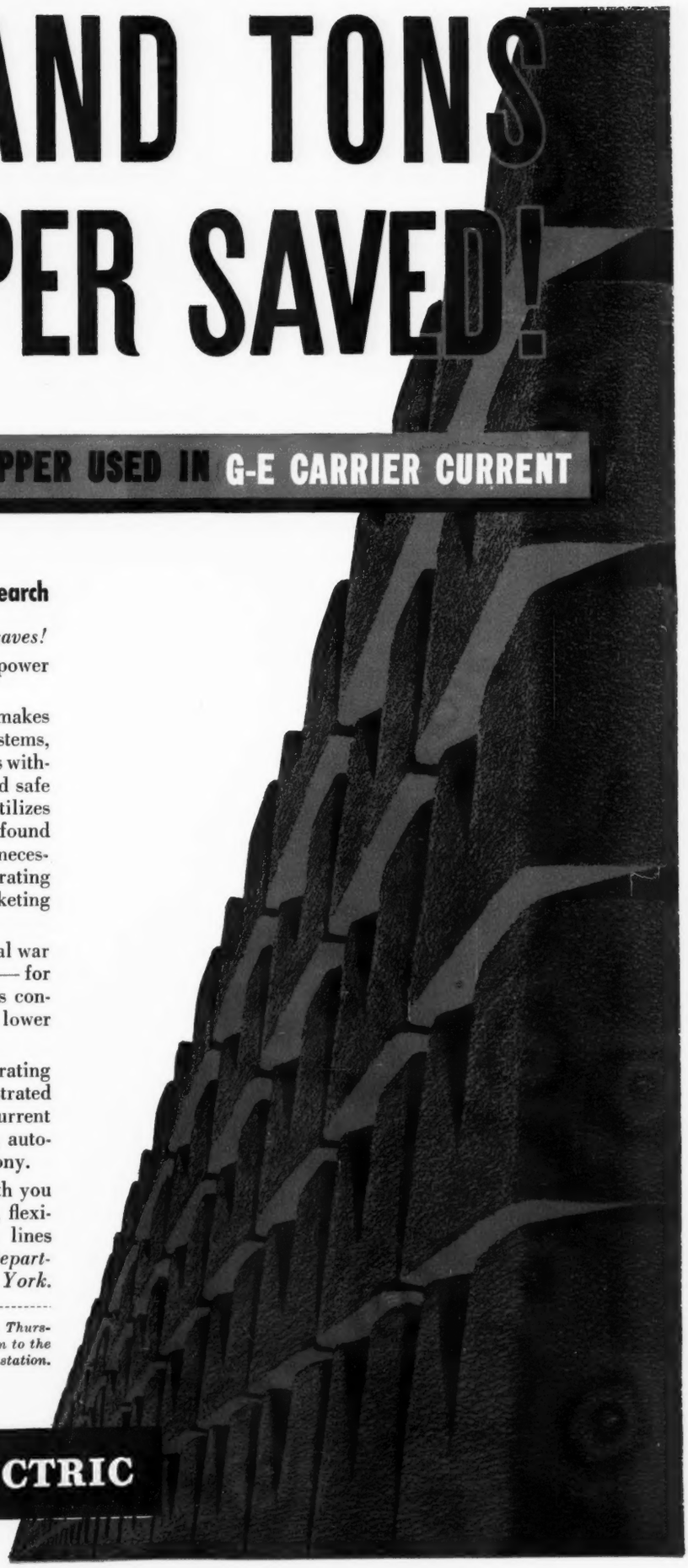
"As part of this controlled inventories plan, we received an inquiry from a Rocky Mountain power company the other day. They were in the market for a lot of line material—hardware, conductor, switches, fuses and the like. We had some of the stuff in our stock that we could let them have, so I sent the list over to the stores department for checking. It took them a couple of days, I suppose. Then it came back to us. Well, Al here, and I spent half a day working out prices we thought were right. Then we mailed the thing off to the Rocky Mountain people. I guess a week passed. Then this morning in the mail we got an order from them. Do you know what the so-and-so's had the infernal gall to order after we had done all of that work? Just one item out of the twenty or more. And it was the smallest of the whole lot—for just $10.55 worth of hardware."

The laugh that went up from the rest of the group was such that the attention of every one in the dining room was attracted to our group

"So you are learning about the supply business the hard way," the sales manager said, still snickering

TONS AND TONS OF COPPER SAVED!

FOR EVERY POUND OF COPPER USED IN G-E CARRIER CURRENT



Another Example of G-E Electronic Research

Above all else, carrier current equipment *saves!*

It saves critical war materials — and manpower for the Armed Forces and war industries.

Superimposed on transmission lines, it makes possible increased interconnections between systems, and new tap points in major transmission lines without loss of stability. It also permits increased safe loading of these lines and more effectively utilizes generating capacity. Power companies have found that carrier current applications make it unnecessary to build new transmission lines, generating stations, and pilot lines to handle the rocketing kilowatt demands of war plants.

Carrier current equipment saves tons of vital war materials — copper, steel, and aluminum — for every pound of these vital metals used in its construction. And it saves manpower through lower operating and maintenance requirements.

Remarkable savings of insulation, generating and other equipment are everywhere demonstrated in practice . . . made possible by such carrier current functions as pilot relaying, transfer tripping, automatic load control, telemetering, and telephony.

Our representatives will gladly discuss with you the possibilities of increasing the reliability, flexibility, and capacity of your transmission lines with G-E carrier current. . . . *Electronics Department, General Electric, Schenectady, New York.*

Tune in on Frazier Hunt and the News every Tuesday, Thursday, Saturday evening over C.B.S. On Sunday night listen to the "Hour of Charm" over N.B.C. See newspapers for time, station.

GENERAL ELECTRIC

151-82-5320

COLE *Builds Switches For Any Amperage*

. . . Here's a 3,000-Amp Design, Serving in a Large Generating Plant

Cole Type KU, 23-kv., 3,000-amp., single-pole, single-throw indoor switch, with hinge front connected and clip back connected.

Whatever your voltage or current requirements might be, Cole Electric can furnish you with a suitable switch. Both indoor and outdoor switches in a great many styles are available, and all of them have features which improve their performance and lengthen their life.

The type KU indoor switch shown has silver to silver contacts, and pressure is applied by pre-loaded springs. It is designed for manual remote operation.

When you need switches, come to Cole Electric.

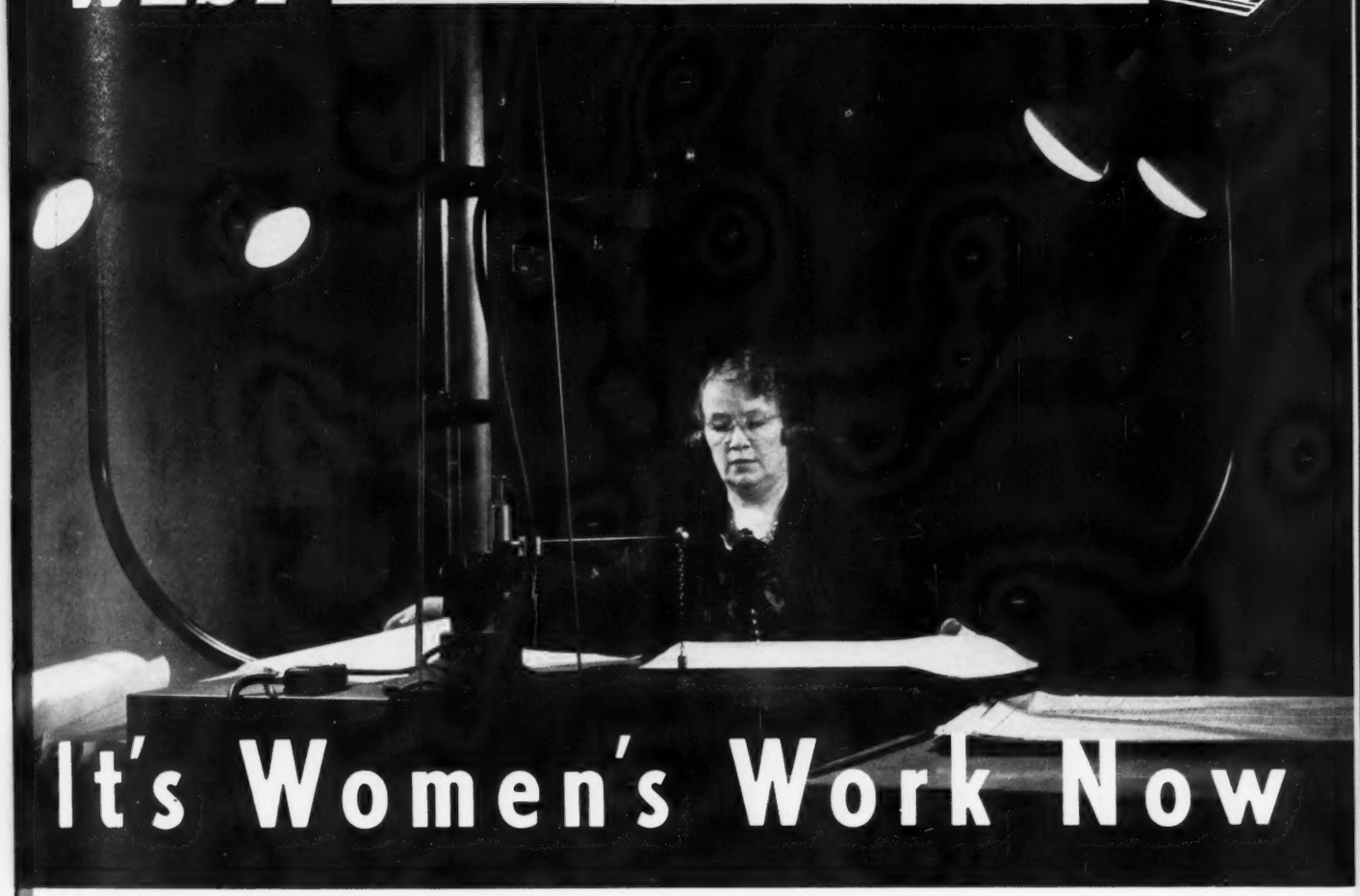
Cole Electric Company

1510 SOUTH LOS ANGELES STREET, LOS ANGELES, CALIFORNIA

Western Representatives: CONDON & YOUNG, INC. 357 SOUTH HILL STREET, LOS ANGELES • EICHER & BRATT COLMAN BLDG., SEATTLE, WASHINGTON

ELECTRICAL WEST

MAY, 1943
VOL. 90 NO. 5



It's Women's Work Now

"O K. Maxine, cut in generator number two."

"Well, Dorothy, let's get busy and overhaul that transformer."

"Give those meters the once over, Mary, and see how they check."

These and kindred expressions are commonplace nowadays in many departments of the Pacific Gas and Electric Co. For the company has women doing a great variety of men's jobs—that is, jobs which hitherto have been done exclusively by men—and it is steadily increasing the number.

Women are filling—and very capably, too—the erstwhile masculine roles of operators in power houses and substations, firemen's helpers in steam-operated generating plants, crews to maintain and service transformers and other electrical equipment, meter testers and repairers, meter readers and collectors, draftsmen and mappers, photographic reproduction specialists, laboratory aides, field clerks on construction projects, packers and storekeepers in warehouses, salvage experts, coach drivers on the company's transportation system in Sacramento, truck drivers and elevator operators.

These women have the same wage scales, hours and working conditions as the men and enjoy the same privileges and benefits.

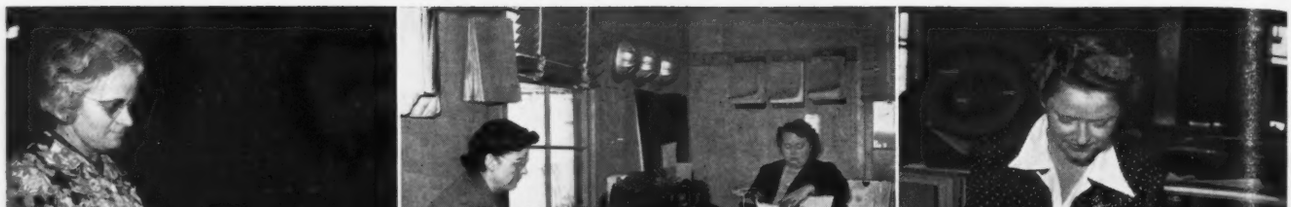
PG and E is using women in men's jobs, and seeking more, for a twofold purpose—to cooperate fully with the War Manpower Commission in its efforts to provide both the armed forces and the war industries with the men they require and also to make up for the fact that more than 2,000 of the company's workers have joined the colors to date. In the words of P. M. Downing, vice-president and general manager:

"The company is most eager to help conserve manpower and to this end we are employing women whenever and wherever it is practical to do so.

"Women already are filling men's jobs in many departments and they are doing excellent work. We were quite sure they would, because throughout the company's history women have given us faithful, intelligent and efficient service in their normal spheres of activity."

PG and E obtains women for men's jobs through several channels. It offers work to—in fact, gives preference to—the wives, sisters, daughters and other members of the families of workers who have joined the armed forces. It urges employees to inform their relatives and acquaintances of the numerous and varied positions open. It maintains close contact with the placement bureaus of universities and other institutions of higher learning, vocational and trades schools, war production training courses conducted by colleges and high schools throughout the territory in which it operates.

To train women for men's jobs, the company conducts a free school where they may learn a great variety of semi-skilled work—and it is contemplating the addition of more classes. Under actual working conditions, trainees now are given instruction and practical experience in how to use both power-driven and hand-operated tools, how to clean electrical connections and solder and tape them, how to disassemble transformers and reassemble them after cleaning and repairing their parts, how to salvage essential materials, how to paint equipment, how to clean and recondition used appli-



Mrs. Forster repairs meters; Mrs. Westerman and Mrs. Fliegler are construction field clerks; Mrs. Davis, draftswoman

ances and to perform many other tasks. Incidentally, they are paid regular wages while learning.

Once on the staff, the women may take advantage of the more than 100 free courses offered by the Pacific Service Employees Assn. By so doing they can, as male employees have been doing for years, fit themselves for more important duties and higher pay.

Largely as the result of the influx of the fair sex, PG and E has established the new classification of "trainees", which applies to newly employed men and women who are being trained to become helpers, apprentices, second operators, oilers and other semi-skilled workers in the operating, maintenance and construction departments. Heretofore it has been the practice to hire such persons under the classification and pay of "laborers". The new classification is more descriptive of and more acceptable to not only the women but also the men, some of whom are engineers or other graduates of universities and thus deserving of a more appropriate and more dignified rating.

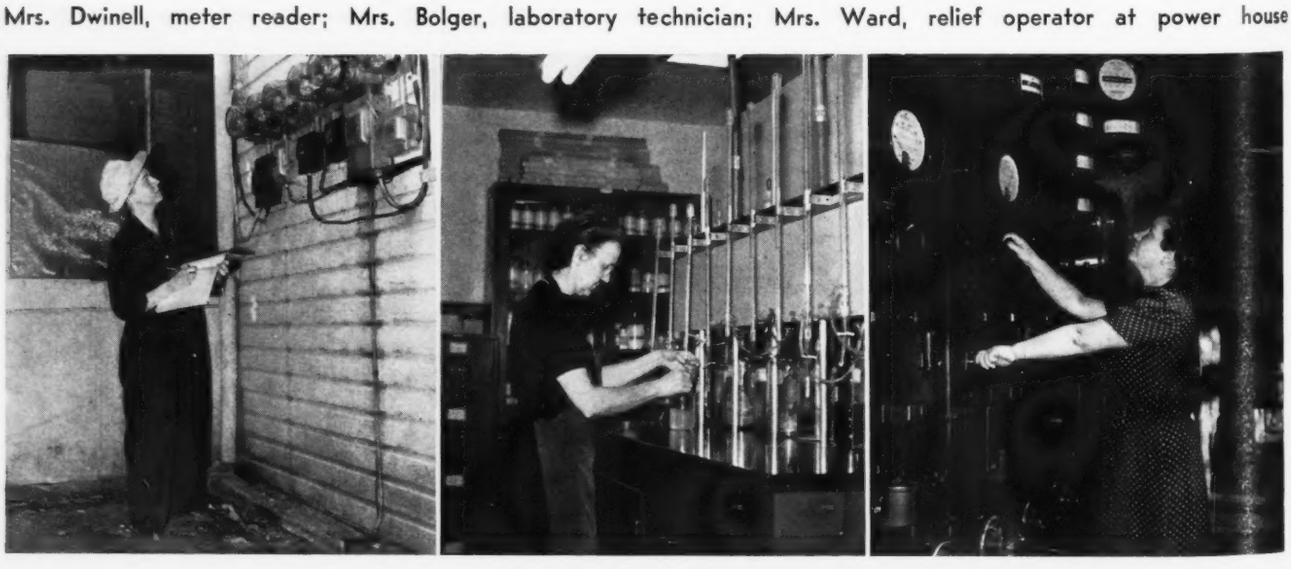
To allow more extensive use of women employees than has been possible heretofore, the company has obtained from the California Division of Industrial Welfare a relaxation of regulations that for several years have prohibited women from working after 10 o'clock at night and before 6 o'clock in the morning. Under the revised ruling, women may work between 10 p.m. and 6 a.m. in certain of the steam-operated generating plants in both the San Francisco and East Bay divisions. As part of the new arrangement, the company provides women working during those hours with transportation to their homes at the end of their shifts. Also the State Department of Industrial Relations has relaxed its regulations limiting the hours of women coach drivers and now permits those on the company's transportation system in Sacramento to work the same schedules as men.

Among the first women to enter the men's field was Mrs. Maxine Ward, who now is relief operator at the South Cow Creek power house, about 18 miles east of Redding in Shasta County. This plant is a semi-automatic unit with a capacity of 2,000 hp. and is one of a group that furnishes electric energy for the construction of the Shasta and Keswick dams of the Central Valley Project and also for work on PG and E's new 214,000-hp. hydroelectric development on the Pit River.

Mrs. Ward's husband, Cedric, is the regular operator at South Cow Creek and she learned the duties from him in her spare time—the spare time she had after her long daily routine of keeping house and taking care of their three children aged 6, 4 and 2 years. She takes over four days every two weeks and now it's no longer necessary to send a man out from Redding, which means a saving not only of manpower but also of tires and gasoline. Besides, as has been proven on two or three occasions during the past winter, she can "run things in the plant" whenever severe storms or other emergencies necessitate Cedric's presence at the forebay, along the flume or elsewhere outdoors.

Both Mr. and Mrs. Ward are enthusiastic about the arrangement, but there's one detail to be ironed out. She believes, that, inasmuch as she takes over his duties four days in every

Mrs. Dwinell, meter reader; Mrs. Bolger, laboratory technician; Mrs. Ward, relief operator at power house



fortnight, he should take over her housekeeping chores while she's at the control board. So far, however, he can't see it that way.

Shasta County also boasts one of the pioneers among the women meter readers and collectors. She is Mrs. Gladys Dwinnell of Anderson. She was employed in the company's office there from 1925 to 1928 and resigned to be married. She became a meter reader and collector last September, after Uncle Sam sent her husband to Trinidad to help direct operations on a large construction project. She has been a success from the very beginning—accurate, quick and popular with the customers. What's more, she has made friends of all the dogs in the community, which is mighty important for one who has to enter other people's property the greater part of every work day and thus is continually exposed to canine teeth.

Topping the list of meter testers and repairers is Mrs. Florita Forster of Oakland. She worked for several years in the meter records department of the Great Western Power Co., which was merged with PG and E in 1930, but retired to devote herself to homemaking. However, to have a share in the war effort, she returned to service last November and joined the staff of the meter shop by choice. She learned enough in the first two months to make minor repairs and has steadily gained in knowledge and efficiency until now she knows meters inside out.

Typical of several women in the drafting room of the general engineering department is Mrs. Elinor Davis, the wife of Lieutenant David C. Davis, United States Navy, who has been in uniform since before the Japs' treacherous attack on Pearl Harbor. She is a graduate of the University of California and qualified for her present position by taking a special war training course at Stanford University in engineering drafting. She and her sister draftsmen now are busy preparing new maps of the company's electric distribution lines according to data provided by surveyors.

In several of the largest steam-driven power plants on the company's system women staff the laboratories, replacing men who, because of their special training and experience, were grabbed up by the Army, Navy or Marine Corps. These women, all college graduates with extensive training in chemistry, make daily tests of the water used for the production of steam and perform many other tasks.

So it goes in department after department—women doing men's jobs and doing them to the satisfaction of all concerned, while growing numbers of "trainees" prepare for such work.

Prefabrication

At Boeing Aircraft Co., Seattle, assemblies of wiring for the Boeing B-17 Flying Fortress are made on wiring templates in the subassembly section of the plant. Below, a woman inspector checking every connection. The picture at the bottom of the page shows a group of women prefabricating the wiring on a template table. After the war who knows how much of the wiring, not only of intricate control equipment, but perhaps housewiring too, may be prefabricated similarly

Women's Sized Jobs

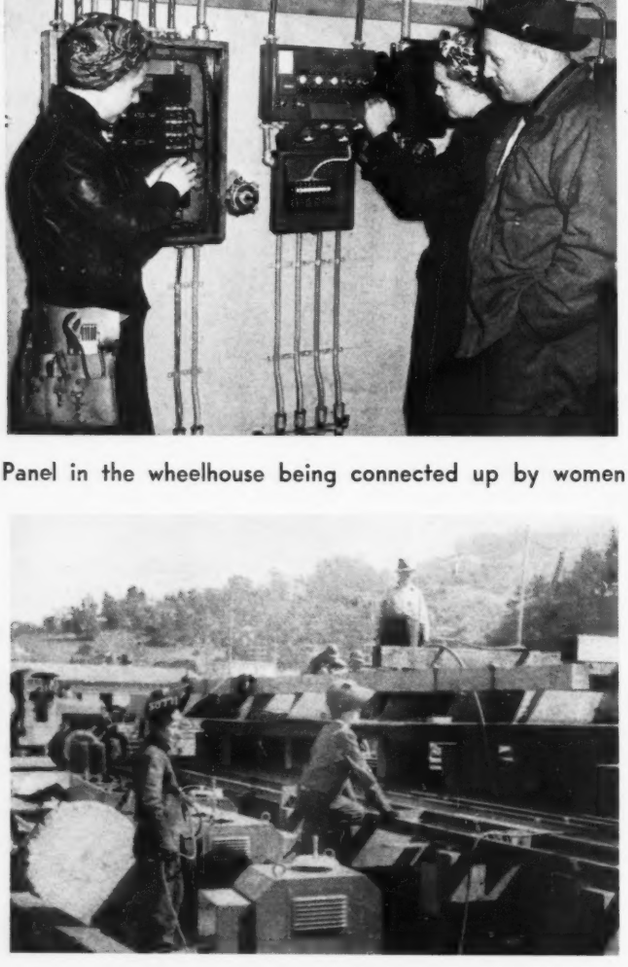
Even the hard-boiled electrical installation kinds they do well

FOUND now working from the bottom of the ship at the ways to the top of the mast at outfitting docks, women have proved capable electricians in the shipyards of Oregon where more than 2,000 are employed. At first it was thought they could replace men only in shops but now they do installation at the ways, work on layout, maintenance, switchboards, fixture installation, even some cable installation. For the outdoor work it takes young, active women, of normal weight, in perfect physical condition, for much of the job requires climbing ladders, work from scaffolds, overhead work. Courses to train women electricians are conducted by the War Production Training Program of the War Manpower Commission at Marshall School, Portland, 7 a. m. to 11:30 p. m., six days a week. With shipboard conditions simulated, women are taught installation methods as well as how to handle tools, hook up switchboards, install fixtures and read blueprints.

Other electrical fields in which women are employed are in motor rewinding. Nearly all motor rewinding shops in the West employ some women. They are especially skillful in coil winding and fractional horsepower motor work. One shop, which employs several women, has found that making a separate department for them works best. In that way separate facilities for them can be provided.

Dorothy Ourada installing electric cable high on a mast

Panel in the wheelhouse being connected up by women



Electrician Charlotte Bail, in the picture above, is installing fixtures in the staterooms of a Liberty ship at Oregon shipyard. Women welders, as seen at left in a California shipyard, are well established in this trade and many are employed by all shipyards. As electricians and welders these women are all engaged in fairly heavy work and doing their jobs with precision and skill.

Here is Prince, a German Shepherd

Some Modern Dogs of War

Canine guards help Puget Sound Power & Light Co. meet manpower shortage at plants and substations

J. Harvey Leach
Puget Sound Power & Light Co.

THE literature of the past contains many allusions to the canine, as the reviews of battle are told in story and song. The references to the "dogs of war" are quite common but, in most cases, the dog is only a metaphor. In this present, all-out, global war, however, the dog is stepping out of the role of the imaginary and is taking a realistic part in the arena of action. This latter fact is forcefully borne out by the use to which the Puget Sound Power and Light Co. is putting dogs in guarding power plants, substations and other strategic properties.

In an interview with Ray Maxwell, assistant plant protection officer, some "doggone" interesting points have been brought out on this subject. As a "dog-sergeant" he speaks in terms of highest compliment when the soldierly qualities of his 19 charges are mentioned. Maxwell especially enjoys spending an hour anytime when he has it to spare (which is seldom) lecturing on the "Dog—His Personality, Temperament and Proper Training."

Among the 19 dogs in service, a sufficient number of blood streams are listed to make them truly representative of the United Nations. All efforts to draw the interviewee out on the racial superiority of dogs in the war effort were skilfully parried in the interest of harmony and unity of purpose. The sum total of impressions gained, however, seems to belie the validity of any claim that might be made in the interest of any "master race"—some of the dogs are just "miscellaneous dog" and they seem to be performing quite as effectively as the aristocrats among the Doberman Pinschers, Great Danes, German Shepherds, Airedales and so on.

In answer to the question, "Where are the dogs obtained?": Some are redeemed from the pound; others are donated outright by private citizens; others are loaned "for the duration" only. None of them are derelict cast offs and just "any old dog" won't qualify. Some dogs, with seemingly high qualifications, prove temperamentally unfit for one reason or other, but thus far no conscientious objectors have been encountered—they all try their best. Health, alertness, ability to learn, and inherent courage are the prime qualities required; excessive friendliness or a too promiscuous affection for people is the chief stumbling block.

Ray Maxwell with a Doberman Pinscher

The problem of salary and working conditions has not proved troublesome as yet. Most of the services thus far are on a volunteer basis, with bed and board furnished by the company. Food rationing has probably had a tendency to soften dog owners in their willingness to donate the use of their erstwhile pets. In one case, however, the canine guard is paid one twenty-five cent War Savings Stamp per day in addition to food and lodging. The envy of the lesser paid members of the staff has become a minor threat to general morale but a little flattery judiciously administered has thus far overcome any open demonstration or "slow downs."

Upon being inducted into the service, a dog is isolated to a point where the guard is his only human contact. Test approaches are made to the plant or property being guarded, his reactions noted, and proper reaction encouraged. It takes a surprisingly short time for him to learn just who is supposed to be in the environs and who is not. One guard brings his own dog and, in all cases, the dog and man become inseparable companions. Some of the guards swear that their "buddies'" can identify a company car as well as a human can, and they all insist that their charges realize that there is a war in progress and take a deep personal pride in their work. One Irish setter with a keen sense of humor is reported frequently to hoist his hind leg in a V formation and smile as he expresses his contempt for everything even remotely connected with the Axis.

Speaking on "men and dogs", the guards testify that when the two don't get along it is the man's fault quite as often as it is the canine's. Maxwell points out an interesting fact here and that is: A dog very rarely bites or otherwise molests a woman. It is a fact that girl meter readers have less trouble with dogs than males. Maxwell also explodes the fallacy that a "barking dog never bites." As a guard, in most cases, a barking dog is just as effective as a biting one, but the fact remains that a loud "barker" may be also a vicious "biter."

Fellows like "Sniffy" make good guards

This chap is just "miscellaneous dog"

Carrier Current Can Provide More KWH

Various applications of carrier current to transmission line operation can increase energy available by permitting increased tie line loading, by reducing extent or duration of outages and by improving communication

G. S. Lunge
Central Station Engineering Department,
General Electric Co.

WAR PRODUCTION, increasing beyond our wildest dreams, constantly calls for more and more of that common essential—electrical energy. But, materials and manpower grow more and more scarce and the rapidly mounting demands for kilowatt-hours must be met. How? By improving load factors, increasing system interconnections and resorting to every device which will increase efficiency, most particularly those which use negligible material and save operating and maintenance man-hours.

Carrier current is one of the most prominent of these devices, providing as it does, means of operating power transmission systems with reliability and flexibility otherwise attainable only by the additional construction now prohibited.

Increased use of carrier current channels utilizing existing electric power transmission circuits can increase the amount of electrical energy available in this country for war needs in three basic ways:

1. By permitting increased loading of tie lines interconnecting different power systems or major subdivisions thereof.

2. By reducing the geographical extent or the duration of power supply interruptions.

3. By providing adequate telephone communication between load dispatchers of interconnected systems to enable them to alter the scheduled power interchange rapidly and frequently enough for maximum benefit to be obtained from the interconnection.

All of the above contributions increase the kilowatt-hours available from existing generating facilities in a given area and consequently represent a definite step toward getting the maximum output from existing electric power system facilities.

Carrier current equipment, like protecting relays, requires only trivial quantities (see Figs. 1, 2, 3) of critical material for its manufacture, compared with the additional power system generation and transmission equipment that would otherwise be needed to provide the increased kilowatt-hours that judicious application of power line carrier current equipment can make available.

The peculiar contribution that carrier current makes towards the solution of the problem of getting more out of what we have available is that, different from the use of pilot wire conductors for the same functions, virtually no more material is needed for a 100-mile channel than for a 10-mile channel.

The six principal uses for power line carrier current channels may be grouped as follows, from the standpoint of their contribution to making more electrical energy available. These are high frequency carrier channels, as distinct from low frequency (usually 720 cycles) carrier as already used extensively on some power systems for improving the system load factor by connecting electric water heaters only off-peak.

Carrier Control of Tie Line Load

Interconnection of power systems has been encouraged by the War Production Board. To realize the maximum benefit from such interconnections, the tie line loading should be controlled automatically. This involves transmitting impulses from the automatic load controller to the generating station entrusted at the particular time with the task of regulating the tie line load. Simple carrier current equipment makes it readily possible for these impulses to be sent simultaneously to several generating stations, any of which can be selected for controlling the tie line load, the selection of the generating station being determined by the system load dispatcher in accordance with power needs and also, in the case of hydroelectric systems, on water conditions. If the tie line loading is thus automatically controlled, it will be freer from severe fluctuations, with the result that the maximum load that can be safely carried in the tie line can approach more closely the load limit of the line. Thus the expected benefits from the interconnection can be fully realized, instead of being, at times, nullified by severe and cumulative power swings between the two systems.

Even in peacetime, and in cases in which few or no system interconnections were involved, numerous power systems had already installed extensive telemetering systems as an aid to prompt restoration of service in emergencies. Telemetering facilities are still more useful if there are tie lines to neighboring power systems. For systems of considerable geographic extent, carrier telemetering is the only feasible form of remote measurement of generating station output and tie line power flow.

When there is more than one interconnection between two systems, any attempt to control, either manually or automatically, the tie line load between the two systems requires the use of telemetering to make available a totalized reading of the net power flow between the two systems. Because of the distances usually involved, and now often because of the unavailability of leased wire facilities for the purpose, carrier current channels for the telemeter readings offer the only logical solution.

It is also important that the system load dispatcher know at all times the magnitude of the power interchange in each interconnection in order that he may be able to act promptly and correctly when an emergency occurs, if major power supply interruption throughout the system is not to occur. Thus carrier telemetering is an essential concomitant of system interconnection, if maximum benefit is to be obtained from such interconnection.

Carrier Current Pilot Relaying

Carrier control of tie-line load and carrier telemetering can aid our war effort primarily by increasing the load capacity of system interconnections (tie lines). Carrier pilot relaying, transferred trip and supervisory control are of value chiefly in reducing the extent or the duration of power system outages.

To reduce the geographical extent of power supply outages, it is essential that faults be promptly disconnected from the system, particularly when these are high voltage transmission line faults. Prompt disconnection

Fig. 3

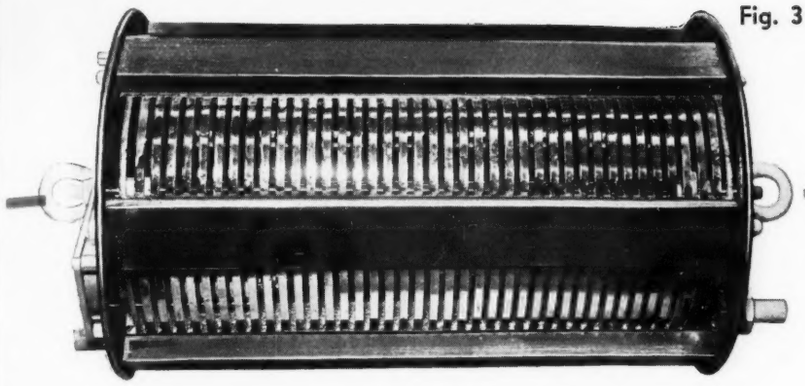


Fig. 3—Carrier current line trap for each end and for blocking branches of the channel. These are essential for pilot relaying or transferred trip channels, but can frequently be omitted at one or both ends of other channels

of faulty line branches or sections prevents back-up protective devices, located nearer the power source, from disconnecting sound and faulted line sections simultaneously and thereby needlessly increasing the area affected by the transmission line fault. Extremely rapid disconnection of faulty lines is vital if a minimum of customers are to be affected by such disconnection, and if the damage at the point of fault is to be kept to a minimum, thereby avoiding burning off the line conductor, for instance. Carrier current pilot relaying permits such rapid disconnection of a faulty transmission line. High speed relaying of this type is all the more vitally needed now because the provision of additional parallel circuits and of alternative sources of power supply over different routes is now impossible because of scarcity of critical materials.

Carrier current pilot relaying has in numerous instances permitted higher loading parallel transmission lines (i.e., closer to the stability limit) than would have been feasible in the absence of such means for immediate disconnection of any line section upon the occurrence of any fault on it.

Comparably close approach to the stability limit of loading and degree of service continuity can sometimes be achieved by equipping a carrier pilot relay-protected, single-circuit transmission line with circuit breakers having ultra-high-speed reclosing features, instead of building a parallel transmission circuit at great expenditure of material. In this case, when a line fault occurs, the line is promptly disconnected at both ends and then immediately restored to service before the synchronous machines at the two ends have time to differ seriously in phase position from each other.

In case of a fault at the terminals of a transformer or inside the transformer, preservation of service to as much as possible of the load requires immediate disconnection of the transformer. In order to conserve critical materials, the high voltage circuit breaker can sometimes be omitted and the transformer connected directly to the transmission line, if carrier is utilized for transferred tripping of the circuit breaker at the other end of the line in the event of trouble occurring in the transformer, as detected by the transformer differential protection relay. The use of carrier for this purpose uses little critical material as compared with that involved in the manufacture of a large high voltage circuit breaker, and still does not sacrifice the reliability of service as would result if no means were provided for disconnecting the high voltage side of a transformer in which a fault had occurred. Like carrier pilot relaying, carrier transferred tripping reduces the duration of faults on the power system, and consequently prevents back-up protective relays from tripping out the entire line when only one of its branches or sections needed to be disconnected.

Carrier Supervisory Control

After modern high-speed relaying has disconnected a faulty line by carrier pilot protection or other means, it must be restored to service as rapidly as possible if the power supply to war industries is not to be seriously interrupted. Supervisory control utilizing carrier channels can provide the means for doing this, especially when switching stations are unattended. Even in the case of attended substations, supervisory control permits rapid direct

Fig. 1—Typical carrier set—in this case a receiver built up of standard units, for receiving six readings simultaneously over but one carrier channel

Fig. 2—Typical carrier coupling capacitor designed for 115-kv. circuits and built up from standard units

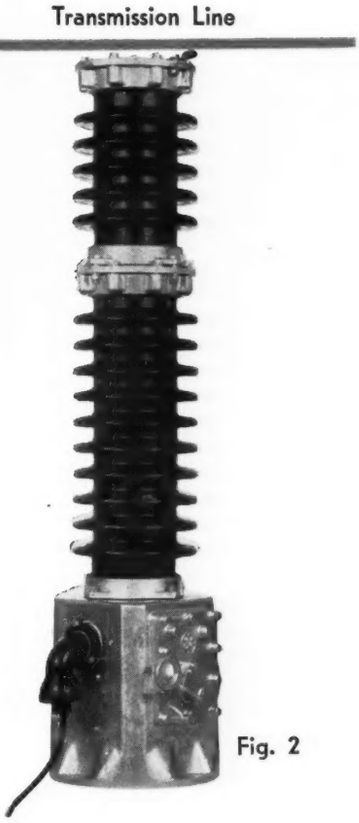


Fig. 2

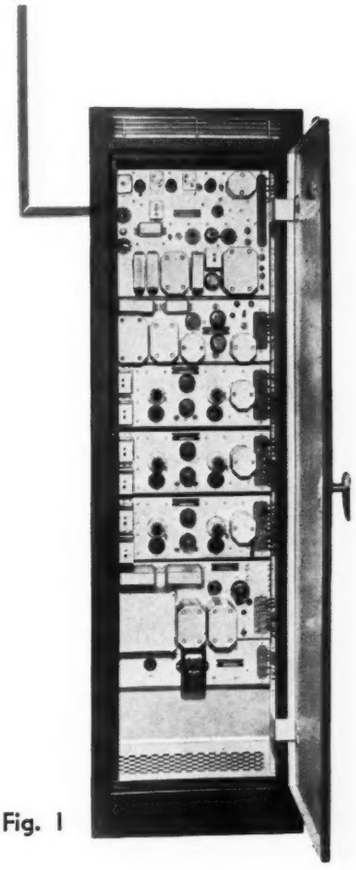


Fig. 1

control by the load dispatcher of essential line circuit breakers, instead of having to call the operator to the telephone to give him instructions and later receive a telephone call from him that those instructions have been carried out. Even when for some reason it is not desired to give direct control of the circuit breakers at the various substations to the load dispatcher, the use of carrier supervisory control equipment makes it possible to give the load dispatcher an immediate automatic indication of the position of all circuit breakers at the outlying substations. As in the case of the other applications considered above, only carrier current channels can usually be given serious consideration under present conditions.

When there is only one operation, such as operating a disconnecting switch or circuit breaker, to be performed at each outlying switching station, it is sometimes possible to use direct carrier control (carrier remote control) of each such switch or circuit breaker, instead of using conventional supervisory control equipment interconnected by a carrier channel.

Carrier Telephone Communication

The preceding applications of carrier are aimed at making it possible to transmit over existing systems and tie lines a maximum of electrical power, and at limiting as much as possible the extent and duration of any unavoidable interruption. The effective use of the efficient system thus made available requires the intelligent cooperation of personnel throughout the entire area involved. The scheduling of power flow to and from the several areas must be planned in accordance with the availability of generating capacity and the variations in load in the several areas, and must be constantly altered in accordance with changing demands for power, water storage, and even as the result of weather conditions. Vastly different and greater telephone facilities are needed for such interconnected systems than for previous independent operation of the individual systems.

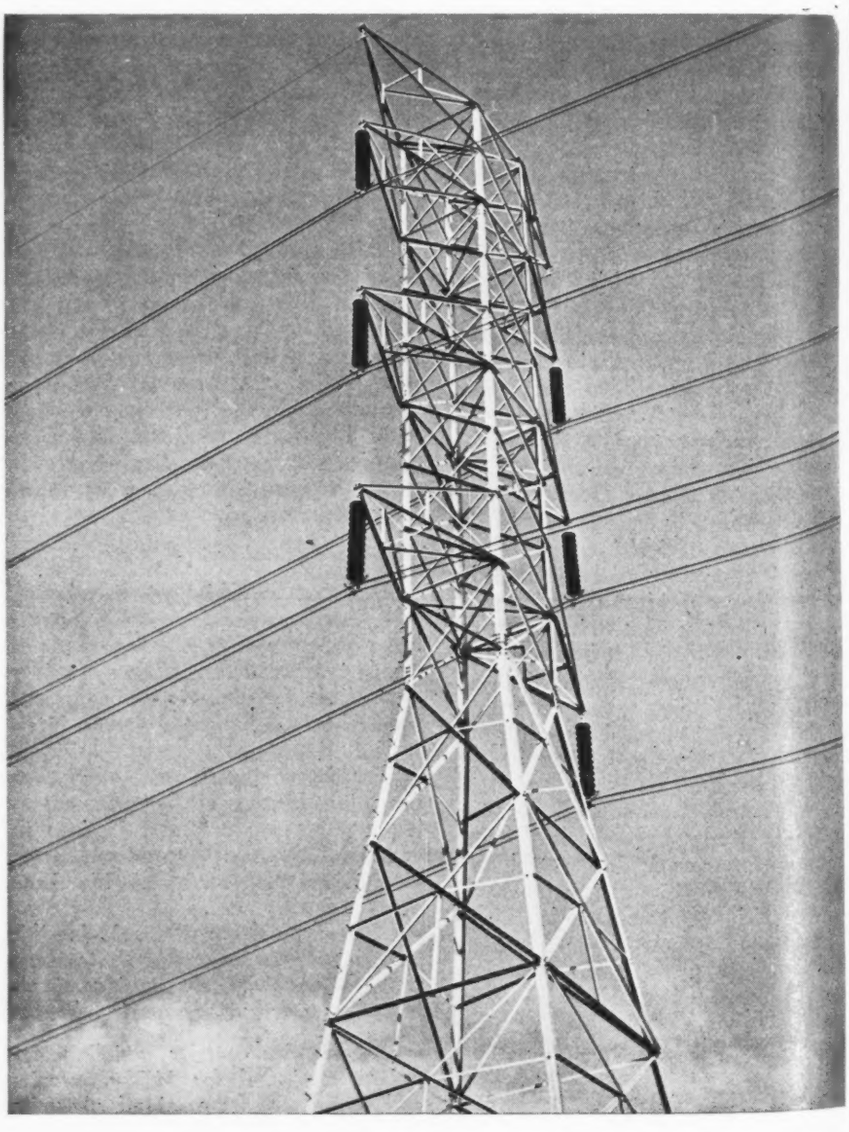
Carrier telephone communication between dispatcher's offices of neighboring interconnected power systems is now recognized as invaluable for both routine and emergency communication. Immediate availability of a telephone channel between dispatchers is vital when frequent or major changes in scheduled power interchange are required. Failure to change the scheduled power interchange promptly may have serious results, such as exceeding transmission circuit stability limits, overloading boilers, and wasting fuel or stored water. Thus carrier telephone communication, like carrier control of tie line load, can make a definite contribution to the effectiveness of power system interconnections and hence to maximum availability of electrical energy.

Under war conditions, of course, the use of carrier telephony is indicated in order to avoid greatly increased burden on the already overloaded public telephone system, and by the unavailability of materials to expand the public telephone.

In peacetime carrier offered many advantages. It is distance-defying and provides low-cost, long-range channels. Employing the transmission conductors themselves, it enjoys all of their mechanical reliability as power conductors, and even more than that, because carrier still functions over a power line under many conditions when it has failed as a power circuit. All of the apparatus is concentrated in terminal stations where it is completely accessible.

Today — in war time — there is in many cases no other choice for channels but carrier, as pilot and other wire circuits simply are not to be had. We dare not neglect any opportunity to increase the kilowatt-hours delivered for essential war needs. Carrier can contribute materially to this effort.

When war loads to be served by this 132-kv. Los Angeles Bureau of Power & Light transmission line increased beyond the capacity of the existing 300,000 circ. mil conductors, a second conductor was strung immediately below the first. This consisted of 3/0 conductor taken from an unused 34.5-kv. circuit. Special hardware was used to suspend the new conductor but the technique employed in stringing was the same employed when the original line was constructed. (See Electrical West, September, 1942, p. 65.)



Meeting Southwest War Power Demands

Full use of interconnections plus coordinated operation of generating facilities has assured ample electric power for all normal and war requirements—Scheduled new capacity will provide for the future

Fred B. Lewis

Chairman, Power Interchange Committee of Southern California

AMERICA has been in the war somewhat over a year now, and this all-out war effort has brought with it a multitude of complex problems to all branches of our industry. During the early stages of the conflict the news releases all indicated that the power industry had been caught unprepared, and that the nation faced a gigantic power shortage, and that curtailment and rationing would undoubtedly follow.

The power industry *did* immediately recognize its responsibilities in the crisis, and met its obligations in a manner which will be to its everlasting credit. Just how well it has done the job is very apparent when we know the facts.

In California alone, during the past three years, the power companies have connected to their lines, and have created service obligations to loads approximating two million new horsepower, and still no power shortage exists.

Since the war started, we have seen and experienced shortages in practically everything we normally need, and we have felt the real pinch of these shortages. We have learned the meaning of the word "rationing," and we have seen that practice creep upon us via sugar, gasoline, coffee, until now it affects virtually everything we do or want, and along with this rationing program have come price increases on almost everything we buy. The shining exception to all this, however, has been electric power and light —an adequate supply—no rationing —no price increase—and this has not just "happened."

Perhaps the most spectacular new loads in the Southwest are the new magnesium plant at Boulder, and the aluminum plant in Los Angeles. Each of these plants will require 200,000 kw. when in full operation.

In order to make the best utilization of all of the power generating agencies in southern California, a committee, known as the Power Interchange Committee of Southern California, was formed last June at the suggestion of the Power Branch of the War Production Board. Later a regional member was added to represent Arizona, since a part of its supply is obtained from California sources on the Colorado River, and likewise one to represent northern California, since, through the interconnection between the Edison and Pacific Gas and Electric companies, important power exchanges are in effect.

Members of this committee are:

Roy Martindale, Bureau of Power & Light; N. B. Hinson, Southern California Edison Co.; J. H. McCambridge, City of Burbank; B. F. DeLanty, City of Pasadena; P. Diederich, City of Glendale; R. H. Halpenny, California Electric Power Co.; E. D. Sherwin, San Diego Gas & Electric Co.; M. J. Dowd, Imperial Irrigation District; E. A. Moritz, Bureau of Reclamation; E. F. McNaughton, Railroad Commission; J. M. Gaylord, Metropolitan Water District; L. H. Doutrick, Central Arizona Light & Power Co.; F. R. George, Pacific Gas and Electric Co., and the writer as chairman.

Interconnections are not new to us in this area, and even before the present condition appeared upon the horizon, the following physical connections between the various power systems were already provided:

Pacific Gas and Electric—Edison	215,000 Kw.
San Diego Gas & Electric—Edison	42,000 Kw.
San Diego Gas & Electric—California Electric Power	10,000 Kw.
Bureau Power & Light—Edison	100,000 Kw.
California Electric Power—Edison	10,000 Kw.
California Electric Power—Bureau Power & Light	30,000 Kw.
Pasadena—Bureau Power & Light	25,000 Kw.
Glendale—Bureau Power & Light	20,000 Kw.
Burbank—Bureau Power & Light	10,000 Kw.
Central Arizona Light & Power—Parker	90,000 Kw.

All of the agencies operate at 60 cycles, except Edison company, which operates at 50 cycles. This apparent difficulty is overcome by the use of frequency changers, and by the operation of the generating unit or units at a frequency different from that for which the unit was originally designed. For example: Edison supplies 60-cycle energy to the Pacific Gas and Electric Co. by operating some of its units at Big Creek at 60 cycles. Likewise, some of the units in its Long Beach No. 1 steam plant will operate at either frequency.

Between the San Diego Gas & Electric and Edison systems, there is a 50,000-kw. frequency changer. Between the Bureau of Power & Light and Edison a 50,000-kw., and between the California Electric Power Co. and Edison a 10,000-kw. unit. Then, too, 60-cycle energy can be delivered by a 60-cycle agency to a 50-cycle agency through sectionalized circuits for redelivery to a 60-cycle agency. Thus, any surplus, wherever available, can be furnished to an agency in need. And another very important point is that the least expensive source can be utilized.

As a concrete illustration, at 7 p.m. on Tuesday, Oct. 27, 1942, the Bureau of Power & Light was delivering 7,400 kw. from its Owens Gorge plants to the California Electric Power Co. Likewise, it was delivering 94,000 kw. to the Edison company; 14,800 kw. to the City of Burbank; 4,600 kw. to the City of Glendale, and 10,000 kw. to the City of Pasadena.

The California Electric Power Co. was delivering to the Bureau of Power & Light 2,000 kw.; Edison company was delivering 30,000 kw. to the San Diego Gas & Electric Co. and 151,000 kw. to the Pacific Gas and Electric Co.

This arrangement also facilitates the conservation of fuel oil. An excellent illustration was an arrangement effected between the Bureau of Power & Light, Metropolitan Water District and Edison company. The new unit for Edison was delayed at Boulder. Likewise, the load of the Magnesium plant was delayed. Thus, a unit of the Metropolitan Water District, which will supply the Magnesium load, was idle. This unit being 60 cycle, was put in operation on the Bureau of Power & Light system, releasing one of its units which could be operated at 50 cycles, for use by Edison, and 100,000 bbl. of fuel oil at Long Beach were saved during the three-month period.

Estimates of load and generating capabilities of all agencies have been made, and are revised from time to time, for the period from the present to 1945. According to these estimates, certain agencies would be short of an adequate supply for their particular load at times, but at such times, surpluses will exist with other agencies.

In the area under discussion, we have both hydro and steam, and even diesel generating plants, so naturally we are very much concerned with water supply, since the hydro plants furnish the bulk of the total power supply.

Water supply, due to generous rains and snow falls this winter, apparently will be better than average, and it should be added that, at Boulder, the lake was filled last year and holds a two-year supply, so that even though this year should prove to be below average on the Colorado River watershed, there is sufficient water in storage for 1943.

As regards 1944, the Power Division of the War Production Board does not plan further war industry for this area, and does not expect any increase of power load over that of 1943.

Under the Lend-Lease policy, our government has seized two steam units of 40,000-kw. capacity each, from the Edison company, for shipment to a foreign country, but has given that company priority for a new unit now being manufactured, of 82,000-kw. capacity, and this new unit is scheduled for operation about July 1 of this year. Being deprived of the two units for the first half of the year is not serious, since an additional unit at Boulder, of 82,000 kw., came into operation on Jan. 13.

New generating sources coming into operation during this year, in the area under discussion, are as follows:

Date	Capacity (Kw.)	Station
March	21,000	PG and E Dutch Flat hydro station.
	6,000	PG and E Hat Creek No. 2 increased capacity.
	10,000	City of Pasadena steam plant increased capacity.
	65,000	Bureau of Power & Light steam plant at Wilmington.
	35,000	San Diego Silver Gate steam plant.
May	10,000	City of Burbank new steam unit.
	7,000	PG and E Oakland steam station increased capacity.
June	25,000	No. 4 Unit Parker hydro plant on Colorado River.
July	44,000	PG and E Oleum No. 2 steam unit.
Sept.	37,000	PG and E Pit River No. 5 first unit.
Oct.	36,000	PG and E Pit River No. 5 second unit.
Nov.	37,000	PG and E Pit River No. 5 third unit.
Dec.	36,000	PG and E Pit River No. 5 fourth unit.
Jan. '44	90,000	Boulder N-7 unit.

The foregoing totals 459,000 kw., of which 288,000 is hydro, and 171,000 is steam. It is likewise expected that Shasta power plant of the Central Valley Project, with 150,000 kw. initial capacity, will come into operation the early part of 1944.

J. A. Krug, Director, Office of War Utilities, in addressing a meeting of utilities in the South, on Feb. 16, said:

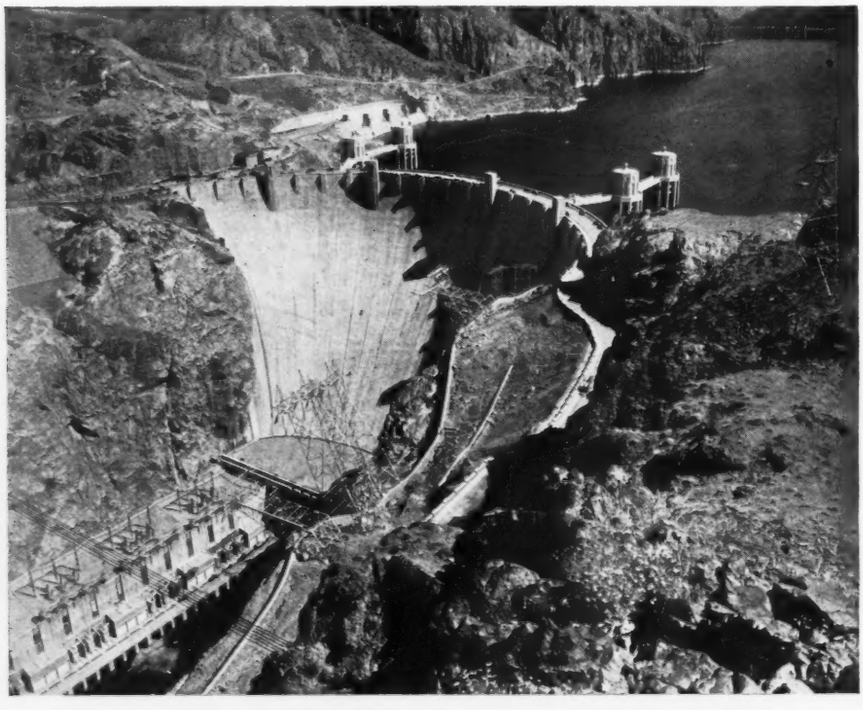
"Electric power is the life blood of war production. Regardless of the availability of materials and labor, modern war production would be impossible without power. It is needed in large quantities to refine aluminum, magnesium, copper, and most of the other critical materials. Likewise, most fabrication depends upon electric power-driven equipment. For these reasons, it is reassuring to know that electric power will *not* be a limiting factor in all-out war production, and that wherever war loads must be carried, electric power will be there in *adequate* quantities.

"Power pooling has been another immensely important factor in assuring an adequate power supply. (Pools have been established in various parts of the United States, including California and Arizona and the Pacific Northwest.) You will be interested to know that through these pools alone, at least one and one-quarter million kilowatts of additional firm power supply have been assured.

"These power pools have been possible only through the most thorough cooperation of power systems—public and private. Differences of opinion and differences of policy as between systems have been pushed into the background, in order that, through such unselfish action, war power loads may be carried with the minimum use of critical materials and labor.

"The power men—public and private, in this area and throughout the country—should be proud of the job that has been done in providing power supply. Power has never been '*too little or too late.*'"

USBR Photograph



Copper Scrap

Number one on the list of critical material shortages is copper scrap. WPB estimates forecast a deficit of 625,000 tons of refinery brass and copper bearing material for 1943. With scrap normally supplying up to 40% of all copper used, scrap refineries are only operating at one-fifth of normal capacity. In recent months only 4,800 tons of No. 1 and No. 2 grades of scrap have been received at refineries, which is only 20% of the amount required.

Industry has been asked to increase the flow of copper, brass and bronze scrap 62½% during the year. This will mean the collection of 1,625,000 tons and the production of 1,000,000 tons of refined copper.

Electric light and power companies constitute one of the main sources of this scrap.

Reclaim It or Scrap It

Puget Sound P & L demonstrates how an efficient reclamation procedure saves critical equipment and produces scrap

L. A. Williams

Assistant to the President, Puget Sound Power & Light Co.

WHEN "do with what you have" and "save whatever you can" became bywords of utility operation, the reclamation departments of power companies really came into their own. Since long before Pearl Harbor, these organizations have functioned effectively and efficiently in salvaging large quantities of critical materials and in conserving for use equipment and supplies that otherwise would have been junked. The reclamation department of Puget Sound Power & Light Co. is typical. Since its organization in 1938 it has recovered $50,000 of materials annually at an average annual net profit of $11,000. In addition it has, since Jan. 1, 1940, salvaged and put back into the war effort the following quantities of critical materials:

Copper	571,423 lb.
Aluminum	2,885 lb.
Lead	580,564 lb.
Brass and bronze	14,239 lb.
Iron and steel	280,594 lb.
Rubber	38,739 lb.
Plus 114 tires and 21 tubes	
Miscellaneous	
Waste paper	20,025 lb.
Battery glass	2,666 pieces

These results are the outcome of a coordinated program in which all divisions of the company have an interest. Scrap materials are collected at various storerooms throughout the property. So are all items of equipment or material that require reclamation service before they can be reused. The latter are shipped to the central reclamation depot at Everett. Salvaged scrap is disposed of through the regular channels.

Reclamation activities cover a wide range and include such things as the splicing of wire for distribution and service conductors; washing and cleaning insulators, repairing fuse mountings and disconnects; repairing transformer cutouts; repairing miscellaneous overhead conductor devices; reconditioning street lighting fixtures; preparations of ground moulding and stubbing band staples; reconditioning guy wires; stripping old weatherproof wire for use as bare conductor; preparation of tie wires from short pieces of scrap; regalvanizing of line hardware after reclamation and, finally, recovery of line splices.

Various reclamation techniques which are the result of experiment and experience may be of interest and value to others.

Upon receipt in the reclamation department, materials are segregated as to the various items, wire being the largest item received and requiring the most attention. Wire is segregated into lots, according to sizes and varieties, depending upon the use for which it will be processed. While segregating the wire, all automatic sleeves and solderless connectors are salvaged, later to be cleaned in a solution of "Mozel No. 121." The best formula is ½ lb. of Mozel No. 121 in 1 gal. of water, in which the connectors are boiled for 10 minutes and are then rinsed in warm water to remove any trace of the chemical. This leaves the connectors clean and bright, removing any materials left from the friction tape covering and with threads free.

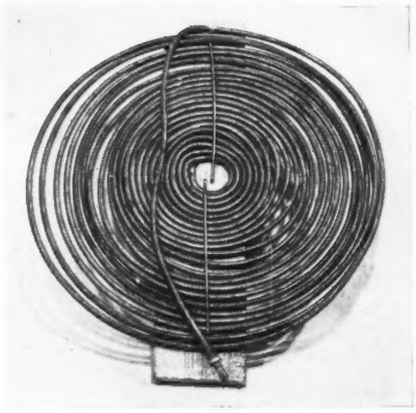
Wire with good insulation, but in lengths too short to be used in the field, is spliced with "Nicopress" sleeves and coiled, by machine, into 160 to 200-lb. coils and is then ready for delivery to the storeroom. Minimum lengths of wire, having good insulation, have been found economical to splice as follows:

No. 8 W. P.	25 ft.
No. 6 W. P.	20 ft.
No. 4 W. P.	15 ft.
No. 4 H. D. B.	15 ft.
No. 6 H. D. B.	25 ft.

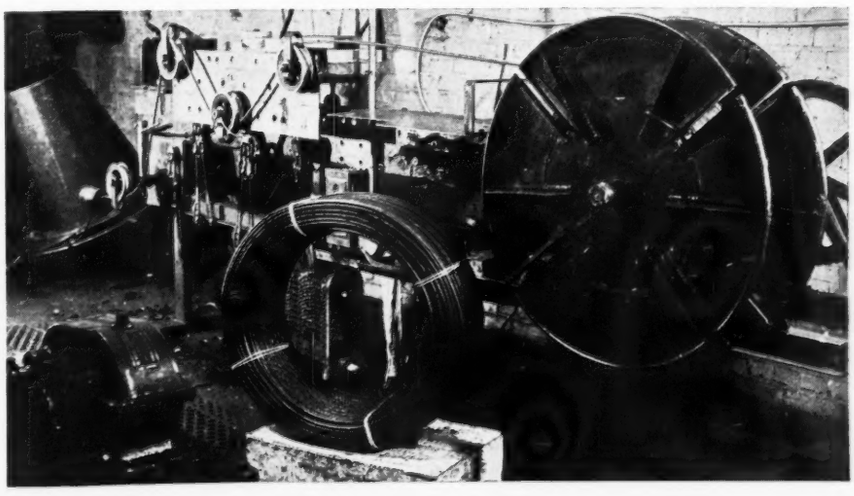
The machine upon which this splicing and coiling is done was made in the company shops and is merely a motor-driven reel, with one removable side, to allow removal of the finished coil. The wire is first pulled through a series of grooved wheels, placed on the machine in a staggered row, which puts enough tension on the line to remove all bends and kinks.

Bare wire is coiled on this machine the same as insulated wire.

Wire with ragged insulation is stripped and spliced and is then used as bare wire. The minimum length of wire found economical to strip is 100 ft. The wire is carried over a series of grooved pulleys to remove kinks, then between a pair of crushing rolls, ad-



This ground coil is made from conductor which otherwise would be scrapped. It is nailed to the bottom of a pole and an 8-ft. tail brought up for connection to the transformer ground wire



This wire splicing and straightening machine reclaims short lengths of conductor. The front of the reel is removable to facilitate taking off finished coils. Note finished coil in foreground

These suspension insulators met all standards except that the hardware was badly rusted. They were cleaned by immersion in an inhibited acid solution and then rinsed in cold water. Finally they were suspended in a solution in an electroplating machine for 3 hours to get a new zinc coating on the hardware and were put back in use

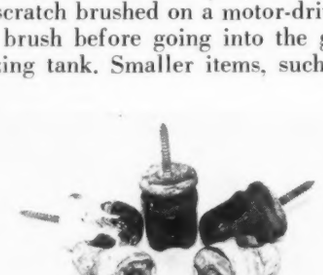
justable as to clearance to accommodate the different sizes of wire. These rolls are motor driven through reduction gears, as is the reel, which is driven by a chain through a friction clutch made up from a Ford brake drum to accommodate the increasing size of the coil.

After the wire has passed between the crushing rolls, it is drawn through a pair of iron wood blocks for further cleaning. After the coil is of sufficient size, it is removed from the drum, tied with twine, and immersed in a kerosene bath for about two hours to remove all trace of the insulating compound.

Lengths of wire too short to splice or strip are worked into tie wires, transformer legs, corner jumpers and ground coils, which we use in place of ground rods. These coils are spirally wound on the splicing machines from wire softened in an open fire, removed from the machine and stapled to a wooden slat, leaving 8 ft. of loose end to be brought up the pole for attachment to the transformer ground wire brought down the pole. Before installing the pole, the coil and slat to which it is fastened is nailed to the butt of the pole with the 8-ft. end brought up to the ground line. The length of wire used in these coils depends, of course, upon its size. Enough wire is used so that the surface area will about equal that of a ⅝-in. by 6-ft. ground rod. When wire larger than No. 1 is used, an 8-ft. length of No. 4 is brazed to the coil using Silfos.

All hardware brought in is inspected and, if necessary, is straightened, rethreaded and galvanized by electroplating with pure zinc. The straightening is done by hand. Provided the ends are not too badly damaged all bolts are then rethreaded on a Beaver pipe and bolt threading machine to which has been added a device for tapering the end of the bolt, which facilitates the installation of the nut.

After these operations, the hardware is then cleaned by pickling in "Oakite No. 32," using one part Oakite and four parts water, for a period of six hours. Larger pieces, such as the larger bolts, braces and metal embedded in porcelain, are placed in an open vat, from which they are removed and scratch brushed on a motor-driven wire brush before going into the galvanizing tank. Smaller items, such as



These before and after pictures show house knobs cleaned by immersion in a solution of Oakite Text X for 3 hours and then rinsed in cold water

washers, nuts, carriage bolts and lags, are tumbled, during the cleaning process, in a motor-driven hexagonal drum, equipped with baffles, which is half submerged in the Oakite solution. This tumbling action eliminates the scratch brushing of the smaller items. The drum is constructed of iron wood, but a metal drum should give long service, provided it is removed from the Oakite and rinsed after use.

Cleaned hardware is then galvanized with pure zinc in a solution of 44 lb. of C. P. crystallized zinc sulphate, 8.8 lb. of pure crystallized sodium sulphate, 2.2 lb. of C. P. zinc chloride and 1.1 lb. of crystallized boric acid, dissolved in 100 quarts of water.

The coating of zinc will build up to .003 in. in about three hours, which seems to be the proper coating for all purposes. Experience indicates that with a potential of 2 volts, a current of 15 amp. for each square foot of surface of materials in the galvanizing tank will give the best results.

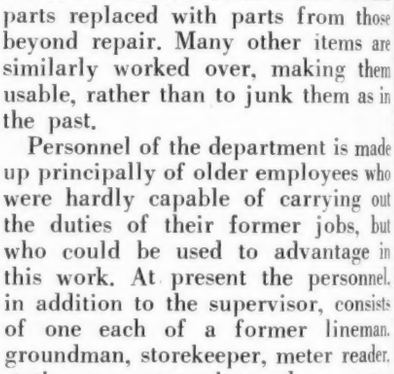
All porcelain and glass insulators are cleaned by immersion in one of two solutions. House knobs, usually covered with paint, are cleaned with "Oakite Test X." This is an alkali base material and will not harm the galvanizing on the hardware, as would an acid base solution. Insulators covered with the usual carbon-like deposit are put into a solution of "Ircosol No. 67," which readily removes the deposit. Care must be exercised in the strength of the solution and the period of the bath as it has an acid base and will etch glass and glazed surfaces of porcelain. A good solution is one part Ircosol to from two to four parts water, depending upon the amount of deposit to be removed, leaving the insulators in the bath for approximately one-half hour. Rubber gloves are worn by operator during this process.

Fused cutouts are cleaned, contacts buffed to a smooth surface and broken parts replaced with parts from those beyond repair. Many other items are similarly worked over, making them usable, rather than to junk them as in the past.

Personnel of the department is made up principally of older employees who were hardly capable of carrying out the duties of their former jobs, but who could be used to advantage in this work. At present the personnel, in addition to the supervisor, consists of one each of a former lineman, groundman, storekeeper, meter reader, station operator, interurban motorman and interurban conductor.

The record shows that the department is contributing valuably to the war effort.

When it was found that there was an oversupply of 28-in. eye bolts for reclamation, some were converted into an 8-in. eye bolt and a 14-in. through bolt as shown in these illustrations



Distribution Fundamentals

Dear George:

FUNNY how few men are consistent in this world except in their belief that an egotist is one who thinks more of his own judgment than he does of theirs. A man will listen to another's ideas, but he'll be wearing a shoulder holster to make sure he isn't convinced against his will. Most men figure there are two sides to every question—their side and the wrong side.

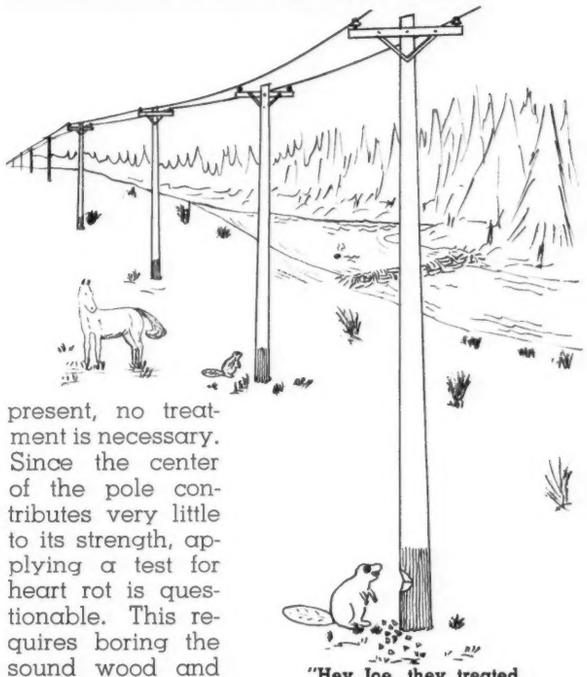
Take the case of Galileo in the 1600s. He knew the earth went around the sun, but the rest of the gang threatened to throw him to the lions unless he acknowledged publicly that the sun did all the traveling. Galileo figured he couldn't demand understanding but would have to command it, so he doctored up his thoughts just enough so he wouldn't be accused of an illegal operation. Anyway, the earth stuck with Galileo.

A few Galileos have advanced theories for pole inspection and in-place groundline treatment, but utility engineers shy away from a standard procedure like a Zero from a P-38. They are inconsistent in every move they make in this direction except in the way they test a pole for rot, and nine out of ten will allow a man to ram a gad halfway through a sound butt, cover it up with plain dirt and march to the next pole whistling, "I'll be down to get you anti-toxin, honey!" Shades of Dr. Lister! He wasn't a tree surgeon but, if his antiseptic discoveries applied to limbs, they certainly apply to the rest of the tree. Testing this way with a gad is just another way of throwing the boss's money down a rat hole.

There is as much difference between a good tester and groundline treatment and a poor tester and groundline treatment as there is between a horse chestnut and a chestnut horse. Poor testers and poor groundline treatments aren't worth their salts and, since the time is coming when poles will be considered so valuable the only checks allowable will be for the down payment, engineers should devote more thought to the subject.

Pole condition can only be ascertained by inspection by trained men who know rot from wrong, who are careful workmen and who have the fundamentals of pole rehabilitation firmly fixed in their minds—also in their heartwood. Inspection and in-place groundline treatment go hand in hand, like Jack and Jill, if the pole line isn't to come tumbling after. A schedule of testing should be laid out for the whole system and records kept to show what cannibal ate what missionary—nothing too elaborate, but something to show what's left in the banks.

The tester should dig all around the pole to a depth of 12 to 18 in. below the groundline, and with a long-handled chisel carefully shave the butt to ascertain whether rot is present or not. If rot is present, it should be shaved off cleanly, leaving nothing but the sound wood. If a predetermined diameter of sound wood is left, the in-place treatment should be applied; if not, the pole should be replaced and stubbed. If no rot is present, no treatment is necessary. Since the center of the pole contributes very little to its strength, applying a test for heart rot is questionable. This requires boring the sound wood and boring invites rot. A few taps with a four-pound hammer will communicate a hollow pole to a trained ear. Of course, if heart rot is serious in certain sections, the boring test can be made and the hole plugged with a wood that has been treated.



"Hey Joe, they treated this one with vanilla!"

In general, all poles in a particular line or circuit are of the same size and carry the same load. When built, they have a safety factor of at least two. When the safety factor becomes less than one, the pole should be replaced or stubbed—preferably stubbed unless someone is particular about the looks and demands that a pole be streamlined like a model at Schiaparelli's. For any particular circuit, the size butt for a safety factor of one can be calculated. Knowing this diameter, the tester has only to measure the sound wood to determine whether to apply a groundline treatment or recommend the pole for replacement or stubbing. This eliminates charts, fancy measurements and calculations, and eliminates the necessity of a technical man on the job.

There are two or three good groundline treatments, containing either phenol or fluoride compounds, which seem to penetrate like a hornet's stinger. That's the main test.

In the stock pile, one pole looks about the same as the rest of the gang and, if well seasoned and well treated, they all contain blue ribbon goods. Putting a pole with an injured butt in the ground is like cutting down a tree to get a single orange. There's one sure thing—the gremlins start taking out their tape measures the minute any tall timber hits the dirt.

Yours,

The Old Soup.

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In War—See More—Do More

Orders may limit general lighting levels but localized supplemental intensity is salvation

C. W. Macy
Pacific Gas and Electric Co.

WITH the present shortage of materials and manpower, the advancing average age of plant workers, the high rate of industrial accidents, the operation of night shifts, the demand for close precision operations and the increasing need for maintained speed of production, seeing tasks must be made easier, safer and faster. Eye fatigue must be cut down.

While military censorship limits what may be discussed about war production factories, one typical plant, operating under war production conditions, may be used as an example of what *can* be done in illumination within the restrictions of available materials and equipment. This plant is the Charles M. Bailey Co. shop in San Francisco.

As in handling any similar problem a definite procedure is important. This began with a survey of the plant to check original conditions. It included questioning of foremen and employees to determine what critical seeing problems there were at specific locations or work areas. Most of these critical seeing tasks required intensities which could not be provided economically by a general lighting system alone.

Some lighting, such as aisles, obviously came under general lighting treatment. Lighting the surroundings, of course, came under the same treatment. The critical seeing areas, however, were in a category of adequate supplementary lighting. Finally, the vital problem of proper intensity balance, or ratio between surroundings and critical areas, had to be considered carefully.

As in machine shops generally, an average assortment of critical seeing areas existed at this plant, listed as follows:

Drill press
Radial drill press
Medium lathe—dry
Medium lathe—wet
Vertical boring mill
Milling machine
Power hack saw
Grinder
Layout table
Testing devices and gage
Vertical turret lathe
Work benches with vises
Assembly area
Buffer

Conditions found were average prewar shop lighting intensities for general lighting of 3 to 5 foot-candles and supplemental lighting of 20 to 80 fc. from bare lamps on drop cords. The color of the light was good; contrast was poor. Source glare was most uncomfortable. Reflected glare was considerable. Shadows were many and deep. Time factor was extremely unsatisfactory.

Relatively the rate of errors was high, with some waste of materials and loss in man-hours. Foremen and employees complained of eye fatigue. The plant operated two 8½-hour shifts. The range of ages of the employees appeared to be about average for similar machine shops. Manufacturing done was that of making automatic valves and parts.

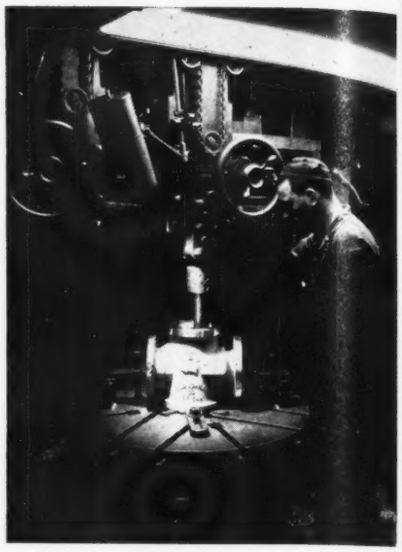
After the change the minimum IES standards for machine shop general and local lighting intensities were obtained. There was a general intensity of 20 to 22 fc. (depreciated) and localized intensities of 80 to 250 fc. The color of light was good, contrast good, glare none, reflected glare negligible, shadows satisfactory, time factor good.

Supplementary lighting units of sturdy and readily adjustable construction had been installed. Hazards due to lighting had been eliminated. There was a material drop in errors. There were no complaints on lighting conditions; instead testimonials of warmest appreciation came from management and individual workmen. The production rate improved. Beginning with two 8½-hour shifts, a third shift was felt to be desirable as soon as additional workers could be obtained. Morale had greatly improved.

Consider industrial lighting improvements or changes from the following standpoints:

Will they—

1. Aid to break essential production bottlenecks?
2. Increase war production?
3. Reduct spoilage of critical materials?
4. Make operation safer and conserve needed labor?
5. Improve effectiveness of older workers?
6. Improve physical condition of workers?
7. Assist to reduce absenteeism?
8. Improve morale throughout the plant?
9. Improve the over-all efficiency of a plant?
10. Aid the civilian effort to win the war?



Underexposed picture to show relative general and local intensities where seeing for inside cut needed Type "M" head with 150-watt PAR-38

Treatment of the situation at this plant followed this procedure. Standard service from Pacific Gas and Electric Co. provided a layout designed to show proposed general lighting unit locations, with work benches, machines, etc. and all critical seeing task areas designated with symbols to denote types and sizes of supplementary lighting units. Arbitrary designating numbers were assigned to each machine or work bench for reference.

Blueprints and specifications were prepared and delivered to the owner in person. The owner called for bids based on these recommendations and the installation was made accordingly. Close contact was maintained with both the plant management and installing contractor, Decker Electric Co., throughout the installation.

Conditions Found

More specifically, in handling the details, the existing situation was analyzed first. Eye fatigue was found to be prevalent and complaints were being registered regularly about it. Obsolete dome reflectors with bare clear lamps provided general illumination, while drop cords with bare lamps furnished localized lighting at machines and work benches. Tin cans,

pieces of paper and obsolete small reflectors adorned these lamps as shields. By no stretch of the imagination could they be classed as reflectors. The intensity was poor and the glare came from many angles and was most uncomfortable.

Specific problems encountered and enumerated were as follows:

1. Lack of working space about certain machines.
2. A few machines, such as vertical or horizontal boring mills, required the lighting unit relatively distant from the cutting tool and yet it was desired to provide high intensity at this point.
3. Lathes that operated with considerable lubrication splash required that the lighting unit and lamp be kept well away from the splash and still maintain a suitable high intensity on the tools and materials.
4. The color of some materials was very similar to the color of the machines, or immediate background, making poor contrast.
5. Many machines were run at relatively high speed.
6. Source glare of a local lighting unit on one machine often became a serious glare irritation for the other fellow on the next or a nearby machine.
7. Reading of micrometers and scales on the machines rapidly and accurately was necessary.
8. Poor housekeeping was due partly to poor lighting.
9. No machines were numbered for identification.
10. Supplementary lighting that could quickly be adjusted for proper position and intensity was needed.
11. Light within a cavity while an inside cut was being taken was often necessary.
12. Age of workers was increasing.
13. Tempo of production for the war effort was intensified.
14. Illumination of the aisles for safety was necessary. Lack of suitable space, due to increased tempo for war production, had resulted in both aisles being used as temporary storage space for partially completed work in progress from one operation to the next.
15. Suitable lighting equipment to fill the requirements, under war conditions, was difficult to find.

In attempting to meet these problems nationally accepted theories and IES standards were kept in mind. It was desirable to treat the plant from the standpoint of (1) intensity, (2) color quality of light, (3) contrast, (4) glare, (5) reflected glare, (6) shadows and (7) time factor.

While IES standards call for a minimum of 20 fc. of general intensity for machine work, there existed a recent Navy Department letter dated Oct. 17, 1942, which recommended 17 fc. for the same type of area. This Navy circular letter, No. 304-42, stated in part:

> Except in very special cases, these values should not be exceeded for the duration of the war. The foregoing recommendations should not be construed to require such low intensities of illumination, where production operations are a major consideration, as to affect these operations.

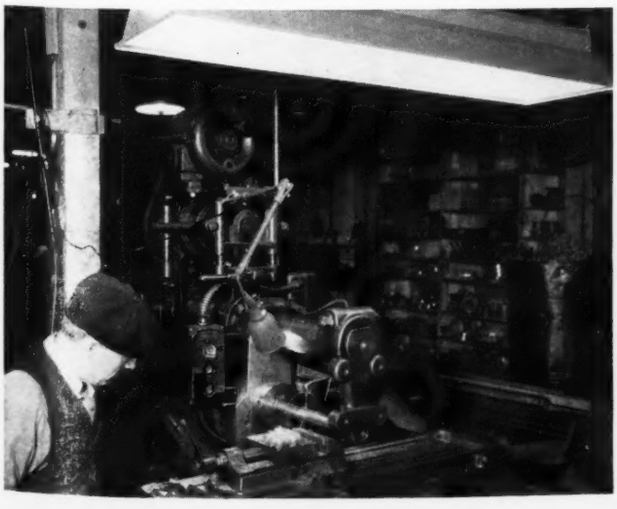
Furthermore, it is a generally accepted rule that good light intensities should have a ratio of 6 to 1 as between the intensity on the immediate work area and that of the general illumination. A ratio of 10 to 1 is considered the limit.

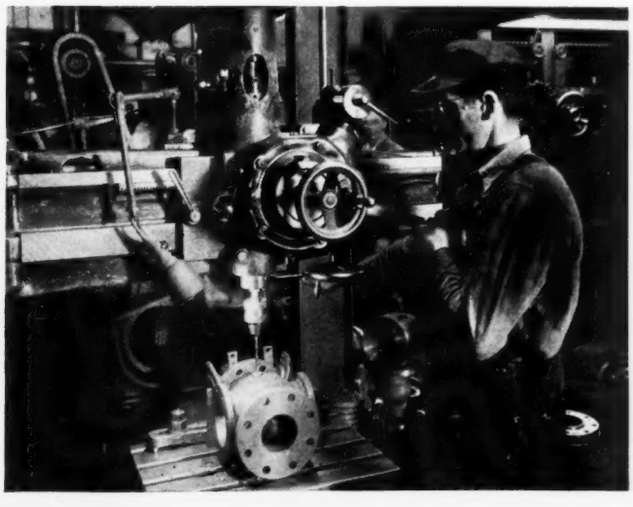
The aim here was to increase production by eliminating all possible eye fatigue during periods when the most difficult seeing conditions prevailed—the night shift periods. It was decided to try to satisfy both IES standards of recommended levels of illumination and the aforementioned Navy Department circular letter No. 304-42. Cost and intricacy of installation, as well as available materials, were to be considered.

Further investigation disclosed that lack of intensity was not the all-important factor, but that the elimination of source glare must be accomplished.

To eliminate source glare from the general lighting system, RLM dome reflectors with 300-watt silvered bowl

At right, "M" head of author's design, away from splash, shoots 220 fc. intensity on wet lathe work without glare. Below: General lighting of 20 fc. furnished by RLM units with silver bowl lamps is supplemented at special critical seeing area with fluorescent industrial unit for the entire machine and supplemental local lighting from small "A" type head with 60-watt inside frost lamp, building up glareless intensity of 110 fc. on work





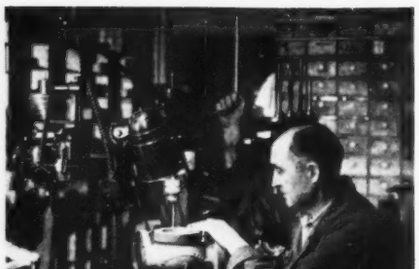
lamps on socket extensions were recommended, spaced on 9 x 9-ft. centers.

In a plant of this type the importance of correcting the lighting over each individual work area is especially vital. Each worker and each machine or work bench constitutes a link in the chain. No single operation can be slighted without affecting the result as a whole. Therefore, each critical location was studied separately.

In a small machine shop experiencing a mushroom growth, with the constant necessity of rearranging machines to fit a change in production process or to expand to handle more work, the lighting system that provides an over-all general lighting allows the greatest freedom to move equipment and still obtain good lighting. When the machine itself carries with it its own local high intensity lighting as well as its own individual motor, this freedom to change and improve at little or no additional lighting cost is an important factor.

Painting of surroundings was likewise important. The power machines were in course of being changed over from belt-driven to individual motor drive. All overhead supports and equipment were being removed. With this in mind, it was recommended that the ceiling, trusses, walls and columns, down to 6 ft. above the floor level, be painted a flat 85% reflection factor white as soon as shop remodeling was completed. A very light gray was recommended for the floor and walls below the six foot level.

Three dimensional painting of the machinery also was discussed with the management.



Local intensity on work of 250 fc. supplied by the author's redesigned "MC" head using 150-watt SB lamp

Localized Lighting

Each individual critical seeing task area was studied for reflector location. Measurements were taken for arm lengths to the most practical base positions. A universal and simple base was designed and made. Now known as 1336M base, it was evolved from the Fostoria No. 106 base.

Where space was a particular factor, the type A Fostoria reflector head was specified. Where normal conditions existed, the type C head was used but a 100-watt silvered bowl lamp was insisted upon. This point is very important from a seeing ability standpoint. By using a 100-watt silvered bowl lamp in a type C reflector head the objectionable source glare to the other fellow at an adjacent machine is reduced to a point where it is quite comfortable, and reflected glare from tools and the machine itself is reduced also.

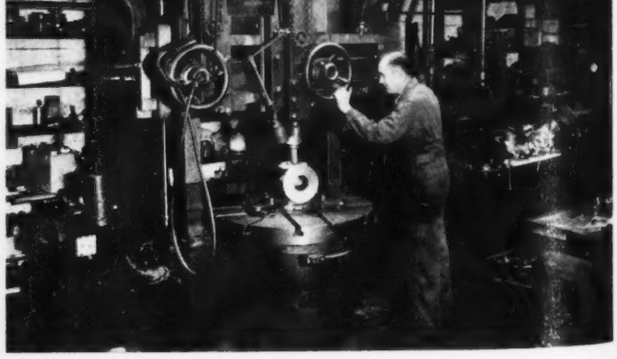
Some reflectors had to be located farther than usual from the work areas, due to the shape of the machines or the presence of extreme lubrication splash. Standard reflectors were tried out on lathes where considerable lubrication splash occurred. Units and lamps were soon covered with a heavy coating of oil. The heat of the lamp soon cooked the oil into a thick, dark covering, thus defeating the purpose of the supplementary light. This coating stuck fast to the lamp and employees resorted to buffing it as a means of removing it. This created another hazard—that of breaking glass. Therefore a remedy was sought.

After checking available catalogues and other literature without success, a unit was designed around the standard P.A.R.-38 Reflecto-Flood lamp. The type M unit was the result. Undoubtedly, further refinements are possible in this unit. Beam spread and distribution appear to be good. Results in intensities checked with the first trial unit show the following:

Distance from face of louvre	Foot-candles
36. in.	110
24 in.	330
12 in.	750

Actual shop experience reveals all too well that general lighting, plus localized lighting for shop use, is a field quite neglected. However, it is one that should be developed immediately for efficiency and speed of production in the war effort.

Standard "C" head was rendered glare-free, both for reflections from the work on this and other dry lathes and for men working at adjacent machines who might see into the adjustable reflector, by using 100-watt silver bowl lamp Precision measurements at the lathe, below, were made



easier, more accurate, quicker by 120 fc. local intensity. Above: Fluorescent unit adds many foot-candles to over-all 22 fc. general lighting over a large machine work area. Gages at either end of vertical boring mill can be read. Local "A" head unit gives 110 fc. on cutting tool itself

To facilitate the work and keep check on the results, arbitrary numbers were assigned to each machine or work bench at this plant. These numbers were painted prominently on each such unit. By this number also they were designated on the blueprint for ready reference. Now they have been adopted by the shop management.

After the lighting installation had been completed and in use for over 90 days, foot-candle readings were taken for general and local intensities. The workers had had time to adjust the local lighting units to suit themselves on their separate machines or work benches. Following were results:

General Intensities
At Spot Check Locations

No. 1—20 fc.	No. 5—25 fc.
No. 2—35 fc.	No. 6—22 fc.
No. 3—20 fc.	No. 7—23 fc.
No. 4—25 fc.	No. 8—26 fc.

Supplementary lighting intensities

"M" Head (using 150-watt P.A.R.-38 lamps)
Machine
No. 8—220 fc. at 30 in.
No. 23—200 fc. at 32 in.
No. 24—200 fc. at 32 in.
(Note—These were mounted on lathes where lubrication splash was a factor.)

"C" Head (using 100-watt A-No. 23 I.F.S.B. lamps)
No. 5—120 fc.
No. 6—160 fc.
No. 9—150 fc.
No. 11—160 fc.
No. 20—150 fc.
No. 21—130 fc.
No. 19—120 fc.

"A" Head (using 60-watt I.F. rough usage lamps)
No. 13— 80 fc.
No. 14— 80 fc.
No. 28—110 fc.
No. 22—110 fc.

Following the installation and after sufficient lapse of time to allow the management and workers to become accustomed to it, interviews were held with individuals connected with the plant operation. Among these were a night shift machinist, a night shift foreman, a day shift machinist, the plant superintendent, the manager and the owner. The main points discussed were the effect of the lighting on production, waste and errors, safety and morale. Excerpts from these interviews will be made the subject of a separate article next month.

Conclusions

Manufacturing plant management men continually ask the pointed questions, "Just how much will a change accomplish and on what basis of definite proof can we depend?"

Unfortunately, much can be read about industrial plant lighting without satisfying these very questions. It is relatively easy to agree upon values for better office lighting or sales display lighting where the factors involved remain the same. However, in a production plant where the assortment of machines varies, the operations change with designs, where almost no automatic operations are performed, where the number of pieces of similar design are limited and changes of tools are frequent, where night time operation has suddenly become necessary, where differences in tolerances permitted often change on the same machine — it is quite another story from space lighting as it was known in prewar days.

Here are needed first-hand experience and record of performance. A local plant with the same climatic and other conditions is always easier to understand and discuss than one located at the opposite end of the country.

This was apparent soon after war was declared and efforts made to spot a typical and logical plant for development of lighting. The Charles M. Bailey Co., originally contacted in the summer of 1942, consented to record carefully this lighting information so that it may be helpful in other plants.

Considerable time was spent with this one plant. The patriotic and enthusiastic cooperation which was enjoyed from the management went far to pave the road for practical application, study and development.

The enemy has miscalculated in depending upon our usual habits of inefficiency and wastefulness. We can do much to upset this factor by employing a streamlined, balanced lighting design with the idea of *seeing* the job to be done, with light that does not fatigue the eye on a given job in eight hours. Greater and sustained war production depends largely upon seeing better and faster with the same effort.

Next month the personal reactions of both management and individual workmen to this high-intensity local lighting will be reported and details of the unit design improvements given.

● "Some Wartime Activities of Underwriters' Laboratories, Inc." is a new publication of that organization describing its work with substitutes and emergency alternates, inspections at factories, special investigation services, development of the new type fire extinguisher and training in military safety. This new work is now conducted by that venerable organization best known to the electrical industry for its testing of electrical materials.

Good—and Dim

Commendation from Lt. Gen. J. L. DeWitt, whose orders have been issued in Proclamations 10 and 12 for complete coastal dimout, was transmitted to the numerous lighting men in the industry who have volunteered to assist the Office of Civilian Defense, through James C. Sheppard, director of the Ninth Civilian Defense Region last month. The letter, which speaks for itself, is as follows:

Mr. James C. Sheppard, Director,
Ninth Regional Office of
Civilian Defense,
1355 Market Street,
San Francisco, California.

Dear Mr. Sheppard:

The numerous problems involved in obtaining compliance with Public Proclamation No. 10, as amended by Public Proclamation No. 12, are recognized and appreciated at this headquarters. The fact that these problems are being solved efficiently and effectively, with a minimum of interference to the war industries and production generally, constitutes, in itself, a testimonial to the patriotic efforts of all personnel associated with the attainment of the desired objective.

I am informed that much of the success being attained is due to the splendid service being performed throughout the entire Pacific Coast area by trained illuminating engineers who, as lighting consultants and advisors to local defense councils, have freely applied their skill and experience to the solution of difficult technical problems.

Also, I am cognizant of the fact that the necessary coordination of this trained talent has been effected under the able leadership of Mr. Frank A. Hansen, assistant regional director, Light Control Division, and his assistants in charge of sector offices of the Office of Civilian Defense.

I take this opportunity to express my sincere appreciation of the splendid work being performed by all the above agencies and personnel, and to commend all concerned for the outstanding accomplishments. May I request that you communicate these sentiments to each individual throughout the Ninth Region, who is voluntarily contributing his time and talents in attaining the desired objective and in overcoming the many problems attendant to enforcement of the dimout regulations.

Sincerely,
J. L. DeWitt,
Lieutenant General,
U. S. Army, Commanding

Mexico Dim Also

Officials confer with U. S. utility light control men

It's dim down Mexico way too. The coastal dimout ordered by Lt. General DeWitt has its counterpart along the Mexican coast, as well as that in Canada. Civilian defense organization in Mexico, too, is thorough and complete, with every male over 15 years of age registered and assigned responsibility. The civilian defense groups drill once each week.

General Brigadier Miguel Orrico des los Llanos, in command of the garrison at Tijuana, is likewise in charge of civilian defense activity from the border to Latitude 31° 30′, including all islands within eight miles of shore. Not long ago he called upon A. I. Benedict, lighting engineer of San Diego Gas & Electric Co. and lighting control consultant for OCD in San Diego County, to come down into Mexico and coordinate the dimout procedure of Baja California, Mexico, with that of the Pacific Coast.

According to Benedict, it took General Orrico but five days to accomplish what it has taken five months in the United States. Tijuana, bright spot of the border, had its neon signs blotted out immediately. Even its street lights, though not visible from the ocean, were dimmed. The highways south to Ensenada, Rosarita and other towns, have been posted with headlight warnings. The civilian defense wardens police the shading of residential windows at night.

Oregon Proclamation

Dimout violations in Oregon were brought under state law when Governor Snell, acting under authority of the 1943 legislature, issued a proclamation establishing the dimout zone in western Oregon following the lines of the proclamation of Lieut.-Gen. John L. De Witt. Previous to this, dimout had been enforceable only in cities which had ordinances providing penalties for violations. The state law extends authority over violators in any part of the state covered by the proclamation.

Almost "Martial Law"

Meanwhile, a California test in an Orange County court brought a ruling from California Attorney General Robert W. Kenny that the dimout lighting restrictions ordered by Lieut.-Gen. De Witt throughout the Western defense command constituted "a limited type of martial law" which supersedes California state automobile headlight requirements. The Orange County court had charged contributory negligence against a motorist who complied with dimout rules, because the state motor vehicle laws require headlights of considerably higher intensity.

● Assembly Bill 300, presented to the California Legislature, which would have nullified state requirements for the naming of subcontractors by a general contractor in the submission of his bid for state work, was tabled when it emerged on the floor of the legislature from committee. The various bills introduced to vitiate the contractors' license law were killed in committee.

● A Guide to Effective Electrical Maintenance, a four-page leaflet, was issued as Part 3 of the News-Bulletin of International Association of Electrical Inspectors in March 1943. The report is also being published without cover for distribution by members to maintenance electricians. It is the compilation of the maintenance committee.

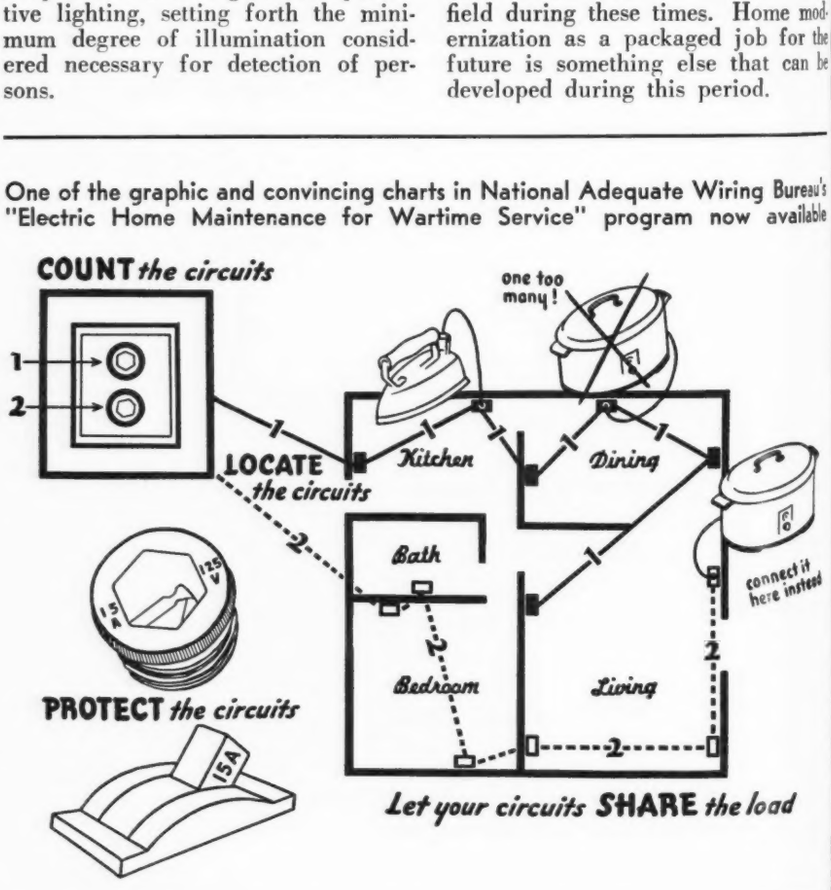
● To Reduce Danger of theft and sabotage in industrial plants engaged in war work, the American Standards Assn. has developed a War Standard for Protective Lighting of Industrial Properties. It is a guide for protective lighting, setting forth the minimum degree of illumination considered necessary for detection of persons.

Electric Key

That wiring is the "electric key to the home of tomorrow, for television, air conditioning, electronic devices, etc." was the inspiration which Arthur E. Schanuel, field representative of National Adequate Wiring Bureau, left with various groups in the industry on a field trip which took him throughout the West recently. He also brought an explanation of the new "Electric Home Maintenance for Wartime Service" program, developed by the national bureau. A visual chart of 20 pages, 22 x 34 in. in size with a script to use in presenting the subject to consumer audiences, includes customer instruction on house wiring layout and the necessity for adequate capacity. The chart carries drawings and diagrams illustrating the points made very simply and by analogy. Stress is paid to placing of appliance loads upon various circuits of the house to prevent overloading and burning out of fuses.

That the utility and contractor group can do much during this period in contacting building and loan companies to impress upon them the importance of adequate wiring in the building of homes which will follow the war, Schanuel pointed out as a job that can be done in the residential field during these times. Home modernization as a packaged job for the future is something else that can be developed during this period.

One of the graphic and convincing charts in National Adequate Wiring Bureau's "Electric Home Maintenance for Wartime Service" program now available



EMEA *Dope Sheet*

Maintenance of Electric Motors

M. Kennedy Bliss

Electrical Engineer, Board of Fire Underwriters of the Pacific, San Francisco

TO those of us charged with the responsibility of continuous operation of electrical motors, new and vitally important problems of maintenance appear. Formerly, we took reasonably good care of equipment and when failure occurred, as it does now and then, repairs or replacement was made in a few days or possibly a week or so, and little or no inconvenience was caused. Now we must take excellent care and precautions never considered before. Our country is at war and fighting for its very existence. Demands upon the service of electrical equipment have increased sharply, thus cutting down our reserve capacity and at the same time making repairs and replacement difficult, slow, costly, and sometimes impossible.

Take, for example, an average small city. Its water system is connected to a small elevated tank to maintain even pressures on the system and its water is obtained from, say, five deep-well turbines located in different parts of town. Normally, only two or three units are used at a time, the others being reserved for emergencies such as fires or summer high consumption.

The war has made a big change in this: War industries have expanded many fold, new residential districts have sprung up almost overnight, and Victory gardens are seen everywhere. The resulting increase in consumption creates a demand approximately equal to the city's entire pump capacity, leaving no reserve in case of fires, failures or peak consumption demands. And inasmuch as new units cannot be added, great importance is placed on proper maintenance.

It is not the purpose here to furnish in detail the procedure for proper maintenance of electrical motors.

There are, however, a number of basic principles which may be stated here as a guide to proper maintenance. The 1940 National Electrical Code requirements as shown on pages 151 to 171 cover installation, wiring, grounding, circuit protection and controllers. Proper installation has a very definite bearing upon the performance and reliability of a motor and careful attention should be given to these requirements. Advice and assistance may be obtained from your City Electrical Inspector, or, if there is no such electrical inspector in your community, this office can be consulted on the subject. In general, the motor should be secured firmly in place (section 1105), properly grounded (section 4435) and protected by controller and overcurrent devices, disconnecting means and circuit breakers or fuses (See Article 430). Valuable aid and testing data can be obtained from the local utility.

Proper lubrication is an important maintenance feature, and while frequency is not usually advisable or necessary, a new motor should receive special care to see that it is well greased without being overgreased. Inadequate greasing of a new motor may cause serious damage to bearings and overgreasing is likely to force grease into the windings, thus accumulating dust and dirt, causing a high rate of deterioration of insulation and creating a serious fire hazard. It is interesting here to note that national figures on fire losses show that motors cause more fires than any other electrical device.

Dirt also tends to cut and destroy the insulation and, if of a metallic quality, it may cause leakage across the coils or across the commutator. Once a year, the motor windings should be cleaned and the commutator (if any) carefully checked for dirt, high mica, uneven wear, etc. Much of the dirt can be blown out by compressed air, but caution should be taken that the pressure is not too high, not over 30 lb./sq. in. in any case.

The air gap (space between rotor and stator) should be checked on four sides, particular attention being given to the side corresponding to the loaded side of the bearings. The air gap must be small to obtain high efficiency and low copper loss. However, any appreciable change in air gap indicates wear in the bearings, due usually to improper lubrication. One large manufacturer of electrical machinery states that the largest single cause of winding failures is due to the rotor rubbing the stator iron, caused as a rule by worn bearings.

The resistance between windings and ground should also be measured. This can easily be done by use of a "Megger" tester but since these instruments are rarely found, a high grade voltmeter and battery may be used to good effect. The resistance from any terminal through its insulation to ground should be approximately 1,000 ohms per volt of the terminal voltage.

For example, the resistance of the insulation of a 220-volt motor normally should not be less than 220,000 ohms. Very preferably the resistance of a motor's insulation should be tested when new, and periodic tests made thereafter to observe and record its condition. The resistance in ohms (R) can be computed thus:

$$R = r\left(\frac{E}{V} - 1\right) \text{ where}$$

r = resistance of the voltmeter in ohms.
E = line voltage (d-c voltage of battery or generator)
V = voltmeter reading.

The direct-current supply (E) should be approximately equal to the normal line voltage of the motor. Low resistance may be due largely to dirt and dampness and the resistance may show marked improvement after cleaning and drying out.

Inspection must be made periodically of controller equipment, contacts, fuses, etc., and consideration given to possible overheating of the motor. Feeling too hot to the hand is not necessarily an indication that the motor is too hot. Heat indicating devices should be used to determine accurately the temperature of the coils. Overheating may result from a number of causes but usually results from overloading, short circuits or low voltage. Operation of a 220-volt motor, for example, on 208 volts is a 5½% drop in voltage, which causes an increase in copper loss (heating) of approximately 11%.

The electrical motor of today is a compact, powerful and reliable source of mechanical energy. Its requirements are few and simple, its value is great. The present national emergency places an unusually high importance upon the proper maintenance of electrical rotating machinery. We suggest, therefore, that those charged with this responsibility obtain a copy of the National Electrical Code, request the services of the electrical inspector and the power company, and write to the manufacturers of the motors in question, giving complete name-plate data and asking for details of maintenance. Then make periodic inspection, testing and servicing.

Who

Joslyn & Ryan, naval architects, San Francisco. Installation designed by W. F. Gunnison, architect, with assistance of A. J. Bergeron, the Miller Co. Installation made by Buzzell Electric Works.

The Need

Higher intensity of illumination, evenly distributed and with minimum glare, so arranged as to eliminate shadows and make possible work over the numerous drafting tables from all sides.

Conditions

Previous installation was of locally made, louvered, two 40-watt F lamp units, two to a bay, suspended about 2½ ft. below a 12 ft. ceiling.

Installed

Continuous wireway Miller "50 Foot-Candler" units, with two rows of 50-watt F lamps, installed at an angle of 45° from walls. Approximately eight 50-watt F lamps per bay instead of four 40-watt. Same mounting height.

Results

Previous average intensity at drafting table top was 18 fc., with some dark areas having 10 fc. Under new system average intensity initially 88 fc., with a minimum of 80 fc. Shadows were eliminated. Diagonal placement of units also reduced apparent glare from unshielded fixtures.

LIGHT for a DRAFTING ROOM

fluorescent

Who

North American Aviation, Inc., Inglewood, Calif., engineering department drafting rooms.

The Need

Evenly distributed illumination of good quality over wide expanse of drafting tables in a large, windowless area.

Conditions

Wide expanse, domed ceilings in which numerous ventilating and other facilities were suspended.

Installed

Continuous rows of twin lamp fluorescent units on wiring channel suspended on pipe rail, approximately 10 ft. from floor. To reduce glare wire netting was placed over each reflector.

TRANSPORTATION—a vital war factor

The effectiveness of our armed forces and civilians alike depends on the efficiency of our transportation

As the battle of Tunisia entered its final phases, with the British and American forces joining hands to crowd Rommel into his last fox hole, Hitler and Mussolini held their twelfth war-time meeting.

One important purpose of this meeting, according to the Berlin radio, was the study of a specially prepared "Survey of Continental Reserves". Topping this list of resources is the item of transportation.

Hitler has a great many headaches these days but, according to no less an authority than the Reich Ministry of Economics, "the central problem of the whole German war effort is transportation". It is, in fact, the Achilles' heel of Germany's War Machine.

The Nazis have become soberly conscious of its crucial importance and Mr. Hitler must wince when he recalls the gigantic miscalculations which led him to neglect his railways.

He counted on a short war, not a long wear-and-tear war and Germany's transportation crisis is getting more critical by the hour. It will play a vital part in its defeat.

This is a war of movement—on land, on sea and in the air. Russia's 2,000 mile battleline, R.A.F.'s 700 mile bombing raids, General Montgomery's 1,500 mile advance last November and the vast area that constitutes the theatre of war in the Pacific make this fairly obvious.

Peace will come when one side gets control over the world's supply of fuel, oil and rubber, for on these three critical materials depend all the vehicles of war—as well as of peace.

An army used to travel on its stomach. Today it travels on its fuel tank.

On the home front, transportation is no less vital. Here it is essential in getting the war workers, their raw materials and their products, to and from the mines, mills and factories that supply our armed forces and those of our Allies. Transportation is a major factor in the nation's ability to out-produce its enemies. Every known method, every type of vehicle becomes essential, for no single group of carriers, freight or passenger, can meet all our needs.

The railroads opened the vast resources of our nation and continue to be the backbone of our transportation system. Today they are doing the greatest job in their history. They are hauling more tons of freight more miles than ever before—33% more than in 1941 and 55% more than in 1918, peak year of the first World War. They are carrying more passengers more miles than ever before—80% more than in 1941 and 24% more than in 1918. They are getting more work out of each car, each engine, and each mile of track than ever before. Private operation of railroads is proving far more effective and efficient in this war than did government operation in the last war.

In contrast to Hitler's Germany, the managers of the American railroads have not neglected their plant except where government priorities forced them to do so. They are turning in an unprecedented performance despite the long starvation period to which they were subjected. During the first World War the total investment in the American railroad plant was about $18,600,000,000. Since then $12,000,000,000 have been spent on improvements and after deductions for scrapped facilities the net increase has been $8,000,000,000. Since the present war in Europe began the railroads have invested about $1,650,000,000 in further improvements, many of them to meet special war needs.

Convincing evidence of the railroads' flexibility in meeting the special needs of all-out war is their performance in coping with the movement of oil to the East Coast. In January 1942, one month following Pearl Harbor, the railroads delivered to the East Coast by tank car less than 100,000 barrels daily. By December they had stepped this up to more than 740,000 barrels and during the week ended April 3, 1943 they

This is the eleventh of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

averaged more than 900,000 barrels per day. By the end of this year they are shooting for the goal of one million barrels a day.

Unlike Germany we have not attempted to control the development and growth of motor transportation according to the "intuitions" of one man but have wisely left it in the hands of experienced competition. That is how our highway transportation system came into being. Growing public acceptance has made it an essential part of our national economy.

The motor vehicle, its limitations set only by the improved highway and the supply of fuel and rubber, has developed to undreamed of proportions. Up to a year ago private automobiles consistently moved more people more miles than *all public carriers combined.* Buses have become an accepted means of mass transportation. Local electric and interurban railways in many cases were converted to bus lines and trucks took over the local freight services. Under these improved operating conditions traffic volume increased. When the war in the Pacific made it necessary for us to conserve our supply of rubber and the U-boat depredations in the Atlantic throttled the flow of gasoline to the eastern seaboard, our motor transport was forced to grapple with the toughest problem that ever had confronted it since it became so vital a factor in the every day transportation.

The "share-the-ride" idea recognizes the need of conserving gas, oil and rubber. This particularly applies to buses, for wherever groups can be assembled for a common destination, buses can be used most effectively. The intercity bus performs for the rural areas the same service that the local bus renders for the residential areas of our cities.

Reorganization of railroad schedules, adaptation of motor transport, rearrangement of working hours, all have contributed to provide a flexible transportation service for men and materials to meet the critical needs of the war effort. Twenty thousand intercity buses are handling 635 million passengers a year which is 69 per cent more than in 1941. The fact that these buses carry a relatively larger percentage of the total coach passenger business than their seating capacity would indicate suggests that here, too, we are getting a more efficient use of these vehicles in terms of passenger loads carried. It is fortunate to note that the geographic location of most intercity bus lines does not coincide with that of the railroads but rather supplements it.

The contribution which the urban transport industry is making to the war effort becomes apparent when we consider that buses, trolley buses and street cars today carry passengers at a rate which promises to exceed the impressive total of 21 billions, as compared with 18 billions in 1942 and an average of 13½ billions for the period 1936 to 1941. And this the industry is accomplishing with a minimum of added equipment and despite a serious drain on its manpower.

The truck lines, too, are setting all-time records. They have rearranged their schedules, eliminated circuitous routes and coordinated their services with those of other carriers. As this is written, contract truckers with the cooperation of the Office of Defense Transportation are trying to eliminate the empty return trip.

The transportation industry as a whole is face to face with the biggest job in its history. Increasing traffic loads, with little if any new equipment, difficulty in obtaining essential maintenance materials and a growing shortage of manpower, combine to make it that. While federal authorities, acting through the Office of Defense Transportation, took prompt cognizance of this condition, froze equipment and otherwise acted to conserve the vehicles then in service, it was not possible to add sufficient vehicles to keep pace with the increased traffic demand. However, the O.D.T. did lend impetus to the movement for staggering hours of work thereby spreading the peak loads and thus increasing the carrying power of existing fleets of vehicles in city service.

As we review the problems involved in meeting our transportation needs it is evident that we cannot depend upon new equipment alone for their solution. Lend-Lease is taking a considerable share of our much needed output of transportation equipment. The immediate job is up to the rank and file of the transportation industries. It is up to their resourcefulness and devotion to their job. The operating men out on the road, the men in the shops who keep the equipment going, who make the most of the metals and other materials they can have, who salvage, conserve and economize . . . these are the men who must bear the burden of our war load.

Theirs is a dramatic story, a story of cooperation and coordination . . . of ever increasing capacity on a shoestring allowance of new equipment.

For this is a war of movement. According to Joseph B. Eastman, Director of Defense Transportation, both the passenger and the freight traffic on the railroads is to a large extent war traffic – the transportation of troops and civilians on war business, the movement of food, raw materials and finished products required for the prosecution of the war. As Mr. Eastman put it, delayed arrival of troops at embarkation ports, delayed delivery of vital war materials could even conceivably mean the loss of men at the fighting front. And what Director Eastman says of the railroads applies to all forms of transportation. Transportation by bus, by street car, by truck, by train, by ship and by plane . . . all play a vital part in the achievement of victory . . . on the home front and on the fighting front which relies upon it.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

Service School Summarized

Joint training program in southern California swings to making dealer acceptance of trainees

WITH issuance of its *Electrical Dealers' Service Index* of authorized factory service stations and appliance parts distributors in Los Angeles County, by the Bureau of Power and Light in cooperation with the Southern California Edison Co., and Pacific Coast Electrical Assn., stock was taken also of the progress made in the joint training program conducted by the Pacific Coast Electrical Assn. Representing the PCEA is Victor Hartley, its managing director; the Bureau is R. H. Cockfield, residential section manager; and Edison is H. C. Rice, merchandise manager.

It was felt that interest had been created and no difficulty experienced in securing trainees. However, so far only two of those who took the course have been placed in repair shops. It was found that most dealers were still looking for completely trained and experienced repairmen and did not feel the necessity, so far, of hiring and training apprentice repairmen even though they all had more service work than they could handle and were threatened daily with loss of their experienced personnel.

Because of this situation the PCEA, Southern California Edison Co., and the Bureau of Power and Light held an informal meeting with a few distributors and service dealers in West Los Angeles, Santa Monica and Beverly Hills area. Three general problems were discussed: availability of parts, effect of price ceilings, and manpower shortage.

Distributors indicated that by and large repair parts are available with the exception of rubber cords, rewound armatures and handles for electric irons. As to manpower, dealers admitted they are in a difficult situation. Price ceilings do not seem to be a hardship, although in individual cases there were complaints.

The unwillingness to employ trainees and the indication of a more serious repair parts and price ceiling problem has caused the committee to delay the training program planned for the West Los Angeles area and efforts are being directed toward the solution of what appear to be the more immediate problems. A similar meeting was held at the Edison auditorium with distributors and dealers. Other similar dealer-distributor meetings in other parts of the territory were decided upon to create a better understanding of the parts situation and the necessary procedure for obtaining them, as well as to discuss the employment of trainees.

In his summary of the first training school, Howard K. Burdick, supervising instructor, summarized that 48 had signed up for the school, of which 6 were women, the total enrollment was 43, average attendance 35, average age of students 47 and certificates of completion given to 30. The certificate required seven or more lessons or 21 hours of schooling. Thirteen of the students had come from the U. S. Employment Service, 8 represented electrical dealers, 5 were dealers' employees. Classes were mixed in nationality, race and sex. Distance seemed no object for several came from adjacent towns.

The class had really high-class instruction from qualified people in the industry. The first class touched upon elementary electricity with definitions of terms, etc., and was given by H. K. Burdick, of Bureau of Power and Light. *Electrically Heated Appliances* were treated by Dick White, of the General Electric Appliance Service Co., at the second and a blueprint for a simple appliance tester was given out.

The vacuum cleaner session came next and included dismantling of four types of cleaners. Al Phillips, of Leo J. Meyberg Co., and W. N. Ferbache, conducted this meeting. Likewise, washing machines were handled by no less an expert that William Vogel, owner of the Electric Appliance Service Corp., who repeated for another session on ironers. In each case a complete disassemble job was done on the appliance in question.

Motor repair was handled by J. O. Case, president, and C. C. Adams, superintendent, of the Quality Electric Co. Radio service was taught by E. E. French, of the J. N. Ceazan Co. Refrigeration service was handled by B. F. Atherton, of the Nash-Kelvinator Sales Corp.

Finally, the handling of a service business was explained by Bert Kramer, of Westinghouse Electric & Mfg. Co., which was followed by a review of all previous class instruction and demonstrations by Burdick.

First class in appliance repair conducted in Los Angeles under joint auspices of PCEA, Bureau of Power & Light and Southern California Edison had good attendance. Below the class at some of the practical hand work given at the conclusion of the lecture. At right is the stage from which lecture and group demonstrations were given on equipment

Utilization Succeeds Sales

Puget Sound Power & Light 1943 program makes complete war conversion of its organization

ITS "sales" program completely converted to a utilization program. Puget Sound Power & Light Co. has just detailed its 1943 plans and activities in a folder blazoned with the dedication, "One goal—Victory." Details of the program are enumerated in three sections on home service, farm service and industrial service. Sales and selling are out for the duration, but more efficient utilization of the company's services is the aim of the personnel of the utilization department, according to Pat Johnson, vice-president.

Home service objectives are to:

1. Help homemakers keep their families in good physical health through adequate nutrition. To help workers in essential war industries keep physically fit through good nutrition.
2. Advise customers how to have their homes adequately lighted in dimout areas for the protection of eyesight. To give advice on dimout regulations and dimout materials and equipment.
3. Instruct homemakers on the economical use and care of appliances.

To implement such a program the home service section conducted refresher courses for its consultants on food preparation, nutrition, marketing, planning, preservation and appliance care, March 8-9. With this renewed information, reoriented to the war, the consultants now will stage numerous group meetings and demonstrations, instruct home economics classes, conduct Red Cross and Civilian Defense nutrition courses. Home calls will be limited to emergency cases because of transportation. Instructions en masse to new users at housing projects, and wherever possible by telephone, letter or office call will be the means used to inform customers.

Demonstration kitchens at Seattle, Everett and Wenatchee will be used to hold Red Cross and other nutrition classes. Care and proper use of appliances will also be stressed in such classes as well as in radio programs each week over several stations in the area.

The home section has done much experimental work on food preservation methods, including canning, dehydrating and freezing and will make this information available to homemakers in such group meetings and over the air.

The four objectives of the farm service section are outlined as follows:

1. Get as much idle equipment as possible to work producing food.
2. Act as a clearinghouse for all new information regarding food production methods.
3. Assist farmers at all times in the use of electricity for increasing food production.
4. Develop a greater interest in more home preservation of foods.

Transportation difficulties will limit farm calls, and so more effort will be made to hold group meetings of farmers and demonstrate such equipment as driers, for dehydration, and dragsaws, for cutting fuel, at such gatherings. Window displays at company offices also will be used to conduct demonstrations of farm equipment.

Farm consultants will keep a farm equipment exchange card file and post notices in local offices showing equipment wanted or for sale. To increase home food production the farm consultants will give information on home gardening and encourage city customers to establish backyard poultry flocks as a source of eggs and meat.

In addition, publicity stories on farm utilization will be prepared. The laboratory of the company will be directed upon substitution of materials in farm equipment in order to insure a source of more equipment, if possible, despite materials shortages. Dealers in equipment will be helped with their technical questions and aided in securing substitute materials. Local manufacturers of equipment will be advised constantly of such substitute materials and assisted with the technical problems arising from them. They also will be interested in new laboratory developments whenever possible.

Experimental work with the CREA and county agents, assistance to 4-H clubs and teachers, radio programs and circulation of *Electricity on the Farm* are included in the program.

The industrial part of the plan describes the difference between the problem a year ago and now. Then conversion of facilities to war production had just begun. Now it is complete and humming. Lighting has been keyed to the job. Today the task is to aid these same industries to make such equipment last longer, work more efficiently, operate more shifts.

"It is expected," says the prospectus, "that the emphasis will swing from the work of converting to war production toward increased utilization and increased production from existing facilities of medium and small-sized plants. It is expected that increase in shortages of manpower will place greater emphasis on maximum efficiency from available manpower by the use of automatic processes, improved lighting and working conditions, improved application of electrical equipment."

Frequent and regular calls on industrials by the company's consultants are part of this program. Improved lighting, dimout and blackout provisions, protective lighting all require careful engineering. War production clinics called by WPB will be carried by the company staff to the entire territory not reached by the central clinic.

Commercial cooking and lighting maintenance and conservation is important since new equipment is unobtainable. Calls will be made on such accounts to advise on the fullest utilization as well as to advise proper care and maintenance. With cooking equipment additional counsel in proper cooking for maximum conservation of critical food supplies will be stressed.

Various informational aids will be sent to customers; publications, local, such as *Electric Chef* and *Selling with Light*, as well as national, will be mailed regularly.

Empty Pockets

To try to locate possible pockets containing a few appliances that are not moving in order to relieve the stringent shortage, San Francisco division of Pacific Gas and Electric Co. sent a questionnaire to dealers along with its monthly *Repair and Service News*. On a sheet dealers were asked to check those appliances, new or used, which they had in stock and available for sale. Constantly asked by the public where they may obtain appliances, this list would be used by residential contact employees to direct customers to possible places where they might be purchased.

Meanwhile, the residential field representatives of this and other divisions started their house-to-house wartime check service. In this customers of the utility were informed on proper care and use of appliances, helped to arrange for appliance repair, helped to purchase needed appliances, shown how to make simple cord repairs, shown the location of the fuse box and taught how to replace blown fuses, given air raid alarm and dimout information, given a list of lighting needs upon request, and at the same time a list was made of the present condition of appliances in use.

Conservice Starts

New compact three-day course in appliance repair offered

While service training schools are being conducted in several larger cities to provide more repair service personnel, the problem of developing such personnel in smaller towns, in many of which all electrical dealers have gone out of business, has concerned the utilities. An answer to this has been well organized by the Westinghouse Electric & Mfg. Co. in what it terms its "Conservice" program which was started in the West at Stockton, Calif., early in April. Another unit, starting from the Seattle office, was to spread over the Northwest territory.

The Conservice program, designed to conserve appliances and render them service—and the program is generous and broad enough to apply to all makes—is a three-day school of eight hours each day. The local utility, (in the beginning program the Pacific Gas and Electric Co.) assists in interesting dealers and possible service men. In those places where no electrical dealers remain, the object is to develop new sources of repair talent among such as gasoline service stations, local machine shops, etc. Concentration on people of over draft age or slightly physically handicapped is done to insure continued interest in the job.

Instructors for the original course are E. C. Watts, Pacific Coast service manager of Westinghouse Electric & Mfg. Co., San Francisco, and Rudy Stanphar, service manager of Westinghouse Electric Supply Co., San Francisco. In the Northwest Walter F. Shantz, assistant to Watts, is organizing similar schools out of Seattle and will extend his meetings into Idaho and Utah. Watts will carry the program through California, Nevada and Arizona.

Basic material used in the course includes charts, slide films and particularly interesting and simplified manuals covering washing machines and ironers, refrigerators, ranges and water heaters and a basic manual *Electricity in the Home* with which the course is begun. These booklets, which have a retail value of $1 at least and contain detailed pictures of every operation, are said to be remarkably fine training material by the P G and E officials.

The Stockton meetings having closed, a second program started in Santa Rosa and others will be held in other towns throughout P G and E territory. One of the difficulties is that of obtaining people who can devote the three full days to this intensive training program, but those who do take it receive an unusually thorough course and thereafter can work quite effectively from the pictures in the manuals furnished them.

Rocky Mountain Electrical League and Public Service of Colo. war service center at Denver is dedicated to bond sales, salvage collection and education of public in care of appliances. At left is the washing machine booth where pretty demonstrator gives advice on its care. At right the salvage display, containing donations of hunting knives, silk stockings for parachutes, and human hair

Second Course

A second refrigeration course was started by the Bureau of Radio & Electrical Appliances of San Diego County in cooperation with the Vocational School April 27, 7 p.m. It was to be conducted by H. E. Fredericks, refrigeration service engineer with H. L. Benbough Co. Elton Bailey was the instructor for the previous class. Limited to 30 enrollees, it was scheduled for two evenings a week, one on theory, the other on practical shop work. While the bureau absorbed the materials fee, enrollees were charged $1 registration, according to law. Text books were also furnished by the bureau.

In the previous course, of the original 31 enrollees, 27 finished, covering a total of 75 hours of theory and shop work. Originally scheduled for 24 classes, it was extended to 30.

● CUSTOMER VIEWPOINT on the use of electric appliances during wartime is being enlightened consistently by *McCall's* magazine in regular monthly features. The April issue carried an attractive two-page spread describing the care of meat in a refrigerator and the cooking of various less-used meats on an electric range. The May issue describes the various practical uses for the attachments of a vacuum cleaner.

Get Aboard

With a Treasury Department citation "for distinguished services in behalf of the war savings program," Hotpoint will continue its "Get Aboard the Bond Wagon" program which it initiated last year. The home planning file, which proved so popular when distributed by utilities, is now being made an offer in the national advertising.

Tie-up of the file is to be made with the builders through utilities and dealers in order to sell the idea of "Buy bonds now for electric kitchens tomorrow." Many Western utilities are expected to tie in their advertising with the theme which will be blazoned in national magazines by Hotpoint during the year, according to W. A. Grove, sales promotion and advertising manager.

G. H. Smith, general sales manager, stresses the appeal of the campaign as follows: "It is giving Mrs. America something specific and something she has always wanted as a goal for buying War Bonds and saving for the home she will have after victory." Posters, advertising material, and home planning files for distribution by dealers and utilities are made available.

● WESTERN FALL MARKET of the Western Furniture Exchange and Merchandise Mart, San Francisco, will be held July 12 to 17, according to Frank K. Runyan, vice-president. Although no electrical supplies are likely to be displayed, former electrical dealers will find housewares and furniture, draperies and gifts with which to supplement their drying up electric merchandise stocks.

Blueprint sketches the kitchen of future and pictures a round electric range

Tie Dreams to Bonds

Seattle department store previews world of tomorrow

Dream homes of the future, with idealized electrical and other equipment, gave impetus to today's major problem, winning the war, at a unique promotion of Frederick & Nelson, Seattle. While this promotion was the department store's annual At Home Week, and, like other dealers in electrical appliances, its own stock had been depleted, the emphasis on electricity in the dream future depicted in displays and publicity gave the event electrical significance. The present-day theme injected everywhere was stimulation of the purchase of War Bonds with which to cash some of these checks on the future after the war is won.

The promotion included an auditorium exhibit, departmental displays, 20 window displays, a 12-page Sunday supplement in the *Seattle Times* and full pages in other papers with daily follow-up advertising and radio spot announcements. Tie-in also was made with the architects' gallery on the fourth floor of the building in which the American Institute of Architects and the Producers Council of Washington displayed a collection of small house plans, particularly stressing radical changes in design for future building.

The auditorium exhibit displayed the tools of war now using materials formerly used in home appliances and home furnishings. These exhibits were obtained from the Army, Navy, Marine Corps, Boeing, Northwest shipyards and the Producers Council. Collections of souvenirs from men in the armed forces also were displayed.

A "Keep It New Clinic" was conducted daily near a "Trend House" and a one-room apartment, employing available furnishings in today's market, for the public to see. In this clinic repairs, cleaning and care of appliances, changing fuses, lamp repairs, etc., were described.

"Dorothy Neighbors," home economist of the *Times*, conducted food preservation programs in the home appliance section. So successful was it that the usual week's program was continued a second week, running in all from March 22 to April 3. Cooperating in the program were Harper-Meggee, Inc., Monarch Appliance Co., Frigidaire, Hotpoint, Bendix, Colonial Premier Lamp Co. and others.

● A CONVERTIBLE ICE REFRIGERATOR sold on a conversion plan is being offered by Montgomery Ward stores. A bond is issued the purchaser giving him the opportunity to purchase for installation an electric unit, within a reasonable time after they become available, after the war.

Colossal

Perhaps the most ambitious "Health for Victory Club," at least in the West, is that which was launched April 9 at Philharmonic Auditorium, Los Angeles, co-sponsored by leading downtown merchants through the Downtown Business Men's Assn. in cooperation with the *Down Town Shopping News* and the Bureau of Power and Light. It was organized by Elbert Kramer, Westinghouse Electric & Mfg. Co.

Ten days prior to the first meeting announcement was published exclusively in the *Shopping News* delivered twice weekly to 465,000 homes. Admission was offered by ticket only, free tickets being made available at housewares departments of leading downtown stores. A limit of 3,300 tickets was agreed upon and within a week all tickets were in the hands of the public and a statement to that effect was published. Stores which had planned large tie-in advertisements were advised to withhold such copy, but it later developed that 50% of the tickets were not used and for subsequent meetings twice the seating capacity of the auditorium will be issued. Next meeting is on May 14 and others will be held monthly.

April 9 meeting was opened by the Color Guard of the Aqueduct Post, American Legion, made up of members of the Bureau of Power and Light. Ray W. Smith, general manager, Downtown Association, acted as master of ceremonies and Ann Martin, home economics director of the bureau, and Charlotte Ferris, assistant to Julia Kiene, home economics director of Westinghouse, put on an hour's demonstration of the preparation and use of meat alternates. A free copy of the 68-page *Meal Planning Guide* was distributed.

Downtown "Health for Victory" club packed the Philharmonic Auditorium

Replacements That Require No Priorities

Less copper in wiring devices, lamps controlled, used appliance prices affected in new regulations

CONSTRUCTION is slowing down to a trickle. and so emphasis shifts from how to get materials for new construction to how to replace materials that fail. Direct from Washington the National Adequate Wiring Bureau obtained this information from Wm. S. James, wholesale and retail trade division of War Production Board.

Contractors and small dealers who purchase replacement stocks of switches and other fittings to take care of their repair business do not have to have any priority ratings to serve on the wholesaler from whom they make these purchases. The wholesaler obtains his supplies from the manufacturer by applying to WPB for rating on form PD-1X.

The only exception to this general rule arises in connection with some particular electrical product which is controlled by a separate L order, such as L-221, restricting the sale of motors, or order M-9-a or CMP regulation No. 5 and CMP 5A which provide that wholesalers may not sell wire and cable except on a rating of AA-5 or better or on a CMP allotment number.

In case of items such as motors and wire, it would be necessary for the dealers' customer to obtain a priority rating by making application on form PD-1A or PD-200 or other appropriate application form and obtain a rating which the contractor or dealer could in turn pass on to the wholesaler.

On fuses, batteries and cord sets, the following information was obtained:

Consumers are not required to furnish a priority rating to obtain fuses from dealers, nor dealers from wholesalers. Wholesalers only are required to request priority through use of form PD-1X to obtain them from manufacturers. The free flow of fuses is essential for proper maintenance of the essential electrical needs of ALL consumers. Distributors or retailers asking consumers for priority ratings should be reported to WPB.

Manufacturers of flashlight and other types of batteries are restricting production to a percentage of 1940 output. This reduced production must take care of the armed forces and other priority requirements. They are free to dispose of surplus without use of form PD-1X. Surplus has been insignificant, but PD-1X will be of no assistance.

Cord sets for irons are available to distributors through PD-1X in limited number. They are to be resold only when defective cords in the same quantity are turned in. The intent is to compel civilian economy. A certification is required by the distributor or manufacturer before he can fill orders.

Farm wiring was extended an AA-3 under special conditions which may be obtained through the USDA county war boards. Issued April 10, it applies only to farms not previously electrified, with a 75 lb. copper limit. Utility service is provided for under U-1-c.

Utilities were given a new certification form for purchase of maintenance, repair and operating supplies under U-1 as amended April 17. Some detail changes are made in previous procedure.

Busway, bus duct and similar enclosed bus systems were put under a new limitation order L-273, on March 25. It cuts the steel case weight and specific amounts of copper are set on different ampere ratings, number of types are limited and an AA-5 is required to purchase it. Trolley busways are not included.

Wiring devices now are to use no copper in them except for current breaking parts under order L-277. This includes sockets, lampholders, switches, receptacles, caps, plugs, connectors, taps, rosettes and adapters. Mogul sockets are exempted, as are devices of 20 amp. or over. Sales are restricted to orders of A-1-j or better. There are other exemptions on special equipment.

Incandescent lighting fixtures were restricted to 60% of the former amounts of metals used and channeled into war work or war housing by L-212, March 31. Sales are restricted to A-1-j orders for industrial or utility type of fixtures. Residential fixtures were cut to 20% of former use of metal. Industrial types are limited to three. Steel covers for glass equipment are eliminated. Louvers, shields, baffles, etc. of metal are forbidden in utility or commercial type units.

Lamps — incandescent, fluorescent and glow discharge now require an AA-5 rated order for purchase by military and industrial buyers. L-28 as amended March 30 puts this restriction on purchases in order to free the surplus for civilian and commercial users. Lamp manufacture has been cut to 60% of 1941. However tungsten and other metal on hand, previously frozen, may be used in manufacture under the amendment. Photoflash and photoflood lamps also require an AA-5.

Restrictions on destruction of rubber covering for copper wire recovery have been eased in order to speed copper salvage under an amendment to order M-15-b.

Idle electric motors are being sought by the WPB electrical equipment branch, which asks industry to list all idle motors. With the restrictions on new motor sales imposed by L-221, the full use of all existing motors and generators is imperative. The used motor unit of this branch is compiling a file for interchange.

Refrigerators Released

Some 148,847 electric out of a total of 400,000 refrigerators will be released for sale this spring, most of them deluxe models of six, seven and eight-foot capacity. Purchasers will attest to their need on blanks available from dealers.

Used refrigerator prices were eased and impractical rebuilding specifications simplified by a revision of MPR-139 by OPA, effective April 15. The revisions reclassified the "as is" and reconditioned with a guaranty, allowed an approximate $5 increase in price, put the lid on rentals and brought the consumer sale of a used refrigerator under the ceiling. The 21-point reconditioning procedure previously required has been shortened to a four-point one relating to performance, equipment and refinishing. A $5 differential west of the Rockies was also allowed on the dollar and cents prices.

All other refrigeration equipment—water coolers, air conditioning, and commercial, was put under stricter production control by L-38, amended. March 27. It affects the entire industry, restricts delivery of new or used parts to emergency repair or orders for armed services.

Precise means of setting maximum prices on radios and phonographs were established by OPA to meet the situation caused by assembly of parts to make new sets having no previous list prices.

Manpower Freeze

Both the previous manpower freeze and the "hold-the-line" executive order 9328, dated April 8, 1943, began to be exercised during April. Workers in other than essential activities could go to work for employers in essential activities, but not vice versa, nor could workers in one essential activity leave it for another, either at the same pay or for higher pay. The Employment Stabilization Program, too, was being signed up in many industries, setting up committees of labor and employer representatives to pass upon clearances of an employee seeking change in employment or transfer.

Used washing machines were brought under similar dollar and cents and guarantee condition ceilings to those of refrigerators and cleaners by OPA April 27, the prices applying to auctioneers and individuals as well as dealers. Rental prices were included.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted

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Confiscatory Regulation

REGULATORY measures as applied to public utilities can become confiscatory in several different ways. A number of these are in vogue now, particularly as regards federal regulation. Take for instance the insistent enforcement of the death sentence clause of the Holding Company Act by the SEC. This forcing of the rapid distribution of assets in the face of unsettled economic conditions certainly is confiscatory. So too is the freezing of rates for service by executive order in the face of rising labor and material costs and skyrocketing taxes. Another confiscatory practice which has received little discussion is brought out in the annual report of the Electric Bond & Share Co. in these terms:

"This industry was built upon the economic and legal principle that utilities are entitled to earn if they can a fair return upon the present fair value of the property devoted to the public service. For over forty years, that has been held the law of the land, since the Supreme Court decision in the case of Smyth versus Ames in 1898. Investments have been made on that sound, fundamental basis. The industry has grown to its present size and national importance on that basis.

"The principle is now, however, under vigorous and concerted attack from many quarters. This is a serious situation, since its proponents not only would have present fair value voided in favor of basing regulation upon 'original cost' of physical property only but would apply this 'original cost' principle retroactively to the industry's earliest beginnings, that is not alone to the property to be built in the future, but to property built many years ago."

This too is unmerited confiscation.

Challenge of Electronics

UNLESS he looks to his laurels, and incidentally his education, the average electrical engineer is going to find that the layman knows more than he does about electronics. If anyone doubts this statement, he needs only to listen to smoking car conversations, read the current popular magazines and listen to some of the radio programs. Seemingly the future of electronics (along with aviation) has captured popular fancy to a remarkable degree.

Credit for the interest in electronics is due in no small measure to the superb advertising jobs being done by some of the electrical manufacturers. Also the thousands of young men being trained by the Army and Navy for radio and radar assignments are contributing to the public appreciation of the future of the electron tube. So is the war itself, with its dependence upon many new and still secret scientific developments.

For an idea of what the public expects from electronics the engineer should read the April 24 issue of *Collier's*. Then he should turn to his technical books and magazines. The applications in all fields of engineering are just as far-reaching. And as challenging.

Postwar Wiring

IMAGINATIONS seem to be working swing shifts these postwar planning nights, remaking the world a little nearer to the heart's desire. Even that bashful, retiring, inhibited stuff called wiring, whose life is spent, inadequately, concealed in the walls, is up for critical examination, not only in this country but in England.

A two-part paper presented to the installations section of the Institution of Electrical Engineers, our contemporary, the *Electrical Review* of London, reports, started quite a lively discussion on this topic. Knowing the potentialities for discussion, yes, argument, always somehow inherent in the subject of house wiring in this land of free speech and inventiveness, the topic is one that will stir up many a new idea here too.

Among the novelties proposed were the carrying of wiring in moulded plastic skirtings around each

room, into which taps could be made wherever needed, the fuse protection being incorporated in the appliance or lamp plug.

In this country, too, there are several who are fashioning wiring plans and dreaming ways in which to prefabricate a job to rewire the millions of old homes whose copper is inadequate. The war has forced back into use the pioneer knob and tube system, even for industrial installations. It has also demonstrated the hardihood of welding cable. Synthetics have boomed into prominence and their potentialities for wiring uses will open up with their availability after war production stops.

All this is fertile ground for the imagination to seed with new ideas and methods. The overworked, run-down wiring systems of the country will be ripe for replacement when the war is over. It is perhaps too much to expect that the various factions and interests will reconcile their views and work in harmony to rewire America, because if anything, the new methods will create more competition for the old. Nevertheless this is one phase of postwar planning that can well engage the clearest thinking of the entire industry.

Postwar Sales Planning

As controversial and as widely discussed as is the subject of postwar planning, there are certain fundamental observations that can be made about it. One is that postwar planning must be done by every organization that hopes to survive after the war. This, because without a plan chances of survival may be remote. Second observation is that any postwar planning operation should include near the top of its manpower an experienced and capable sales executive.

Granting that many of the problems to be confronted once victory is won will be economic and political, the basic fact as regards business and industry is that full-time employment and maximum national income must be maintained. Some will argue that this is primarily a production problem, with a job of financing nearly as important. But more important still is the marketing—the selling—job which must be done. Goods cannot be produced unless they can be sold and that is a task for a trained sales organization. Thus much of the planning for postwar operations hinges on the ability of sales and marketing departments to analyze changing markets, to relate proposed new products to possible markets for them, and to reduce marketing expenses and improve marketing efficiency to meet postwar competition.

So too much emphasis cannot be placed now upon the importance of planning a postwar sales structure. And also upon giving this job to a sales executive.

Order the Little Things

ANYONE experienced in business or production appreciates the necessity of handling the hundreds of little things that are corollary to the big things in order to operate successfully. In the speed of the war program sometimes this vital truth is forgotten, with the result that although the major items are ordered and delivered, final completion is held up because some of the hundreds of small fittings and parts are not available.

Usually this sort of tie-up is caused by not ordering the little stuff, the accessories, early enough to permit the manufacturer to put through his allotment requests, obtain the materials and fabricate them. It takes the manufacturer of small stuff just as long to obtain his materials as the maker of heavy stuff. In these days early enough means four to six months.

A lot of the high pressure and nagging of flocks of expediters would be unnecessary if more foresight was exercised in the advance ordering of the detail fittings and parts, especially those in the electrical field, for many are intricate and require care in manufacture and expert testing.

WE know that wherever government has entered into the domain of private enterprise, in so-called "mixed" economies, it has come to dominate business. In any partnership between an all-powerful government and a business organization, large or small, the private side of the combination inevitably becomes the silent and helpless partner. By the same token, wherever government has entered into partnership in trade unions—as in Germany, for instance—it has meant that the trade unions were reduced to total impotence. Americans throughout their history have harbored a healthy distrust of "big government." That distrust remains our greatest defense against superstatism . . . There never was a time in our career as a nation when it was more important to weigh every project for state control in the scales of personal liberty and personal initiative. Every time the state subsidizes an individual, the state by that act becomes more authoritative and the individual gives up some right. If that process were to be carried to its ultimate conclusion, then it would only be a matter of time until the state would be the master, not the servant; until the state had all the power and the individual had none; in short, until the state became total and absolute.—Eric A. Johnston, president, Chamber of Commerce of the United States.

Begin Inspector Meetings

Rocky Mountain Chapter IAEI starts series with war adjustment discussions of wiring materials

ELECTRICAL inspectors at the Ninth Annual School conducted March 25 and 26 in Denver, under auspices of the Rocky Mountain Chapter, Western Section, International Association of Electrical Inspectors, learned: (1) Utilities of the United States added less new generating capacity in 1942 than in any year since 1923; (2) that the War Production Board (in Denver at least) is a very helpful agency, designed and manned for the purpose of aiding contractors and builders in their efforts to obtain critical materials on essential jobs by the shortest possible route; (3) that the National Electric Code is WPB's "bible"; (4) that re-inspections were never so important as now, when substitute materials and methods are on trial; and (5) that the electrical industry had already made inventories of critical materials and established emergency agencies for their conservation and distribution before the government had completed its survey of stockpiles.

Marion M. Wilson of Fort Morgan, Colo., chairman of the Rocky Mountain Chapter, presided at the two-day "War Conference," where representatives of 14 municipalities in five states were assembled. His opening remarks emphasized the great importance of adequate safeguards to electrical installations by citing a $2,000,000 fire loss directly attributable to a community's rejection of electrical inspection service.

Victor C. Moulton, president of the Western Section, IAEI and secretary-treasurer of the Rocky Mountain Chapter, asserted that, though the Code—which had been built up through fifty years of effort—is being rapidly torn down, the industry can afford tolerance toward temporary expedients in the interests of the all-out war effort. He predicted that many make-shift methods now being dubiously tried out may become standard practices; that materials substituted during the present emergency for lack of code-specified equipment may prove to be better than those formerly used. He urged that the industry help win the war by not quibbling over non-essentials; saving effort and materials by undertaking only vital extension projects, and collaborating fully with government agencies, without attempting any sharp practices.

A high point of interest was achieved when E. L. Spangler, construction specialist with the Denver War Production Board, responded to an address by V. D. Markham, Colorado Springs city electrical inspector. Markham bared to the guest official tribulations suffered by contractors, builders, electrical utilities and inspectors, due to regulations, limitations, confusing priority ratings and other style-cramping difficulties imposed by federal mandate on the electrical industry. Spangler, a competent trouble shooter, evaded no issues, answered all questions to which response could be made on the spur of the moment, and invited a detailed presentation of grievances to the local WPB, promising quick remedies to any conditions caused by red tape, misunderstanding or inept administration. He acknowledged that some regulations had been written by groups not familiar with all uses of certain materials, but said that all unnecessary hardships are being eased as rapidly as intelligent administration can accomplish this.

Charles F. Farrah, the newly elected chairman of the Rocky Mountain IAEI

Interim Code amendments to bridge war emergencies were explained by Victor H. Tousley, field engineer of the NFPA. He recalled that specialists within the industry anticipated the shortages that would prevail immediately after Pearl Harbor, and had a conservation program worked out when Washington took over.

Copper, Rubber, Wire and War was the subject on which Austin Dunham, district manager of the Anaconda Copper Co. spoke. He dealt with the availability of essential materials, and provided valuable information on procedure to obtain them. Priorities, he pointed out, can be got only by stipulating the individual needs of the applicant, and are issued on a basis of the scarcity or abundance of the materials required. He told why certain types of material are not available, and what proportion of the applicant's needs will be filled.

F. F. McCammon, Public Service Co. of Colorado's superintendent of electrical operation, disclosed that the country's electric utilities had so accurately anticipated the country's civilian needs for 1942 that, by converting facilities to war production, generating equipment already installed or in process of installation was sufficient to handle the sudden acceleration of manufacture of war implements in most areas. Overloading of equipment is a big factor in supplying sufficient electric power for the demand placed on it.

Charles B. Farrah of Denver is the new chairman elected by the inspectors. His running mates for the succeeding year are: W. C. Quandt, Pueblo, Colo., and V. D. Markham, first and second vice-chairmen, respec-

Pictured at the Denver meeting are from left: Victor C. Moulton, president Western Section, IAEI; Marion M. Wilson, retiring chairman, Rocky Mountain Chapter; Elmer Trankel and Harvey Christensen, inspectors of Rapid City, S. D.

tively. Marion M. Wilson, by virtue of his chairmanship recently relinquished, became a member of the executive committee. Tom McKay, Colorado Springs, was elected to the executive committee to replace Markham. The other eight members of the committee were re-elected, as was Victor C. Moulton, secretary-treasurer.

Utah Inspectors Too

War has caused such difficult adjustments in use of wiring materials and wiring methods that the second annual meeting and wartime conference on code and construction problems, scheduled for April 28 at Newhouse Hotel, Salt Lake City, was especially timely. Staged by the Utah Chapter, Northwestern Section, International Association of Electrical Inspectors, it was presided over by J. Hyde Stayner, Utah Power & Light Co., first vice-president of the Northwestern Section, and Reuben E. Baxter, chairman of the Utah Chapter.

The program, a one-day session, was to be addressed by representatives of various groups in the industry locally and by representatives of the War Production Board. Outside speakers were F. D. Weber, secretary-treasurer of the Northwestern Section and Herbert G. Ufer, western superintendent, Underwriters Laboratories. Further details of the program will be reported next month.

Million-Volt X-Ray

A verbal trip was all that the Southern California Chapter, International Association of Electrical Inspectors, could take to the million-volt x-ray testing laboratory of Triplett & Barton during its March 31 meeting at Burbank because that laboratory is engaged in important war production. However, Dr. Leslie W. Ball, physicist and an associate, described the construction of walls and shielding to protect operators from these tremendous penetrating rays. Larry Trim, electrical inspector, was host and Chairman William Tretheway presided.

It was not of million-volt x-rays, however, that the inspectors were mostly concerned. Adjustment of the many factors involved in seeking to make War Production Board limitations jibe with state safety orders and the National Electrical Code and local ordinances consumed most of the discussion time. Particular problems in the rewiring of old buildings for subassembly factories where rather heavy loads of 440-volt power circuits must be installed caused concern.

Frank Short, electrical engineer, Industrial Accident Commission, emphasized that where changes are required by the WPB each case must be handled separately and proper consideration will be given to it by his department. Arthur Veit, Los Angeles County electrical inspector, declared he had found WPB reasonably cooperative in permitting use of whatever wiring supplies are necessary to protect an installation and provide a safe job.

M. G. Seus, vice-president, Leo J. Meyberg Co., representing the Pacific Coast Electrical Assn., talked on the advantage of passing the PCEA substandard ordinance regulating the sale of electrical appliances.

At the invitation of Otis Newcomb, the May 26 meeting will be held in Long Beach as it has been each May for several years. President O. D. Butterfield, of the Southwestern Section, discussed tentative arrangements for the annual meeting of the section in Los Angeles this fall.

War Production Clinic

Freely exchanged ideas and methods have made American industry what it is—progressive, fast moving, exceptionally productive. To accelerate this free exchange in the interest of the war production effort the War Production Board is calling a series of clinics in all of the major war production centers. Second of these in the West was held April 30 at University of Southern California, in Los Angeles and in it electrical industry members were prominent as well as numerous.

At the afternoon and evening panel sessions especially were electrical people engaged in this important interchange of ideas for the benefit of production engineers, foremen, set-up men and others. The "factory electrical equipment panel," presided over by T. M. Blakeslee, Bureau of Power & Light and with A. D. Brown, Los Angeles manager of Allis Chalmers Mfg. Co. as general speaker, had on it the following subject leaders:

Factory and office lighting

a. Industrial lighting for maximum production—by H. J. Chanon, General Electric Co., Lamp Div.
b. Efficient office lighting for war plants—by T. H. Shephard, Bureau of Power & Light.

Emergency rating of electrical equipment

a. General basis of apparatus ratings—by C. L. Sidway, Bureau of Power & Light.
b. Emergency up-rating of electric motors—by R. K. Collins, Westinghouse Electric & Mfg. Co.
c. Wartime loading of wire and cable—by H. J. Wheeler, General Electric Co.

Electrical maintenance

a. Care of motors—by Glenn Farr, RKO Studios.
b. Care of control—by Nels Swanson, Goodyear Tire & Rubber Co.
c. Maintenance programs—by Howard C. Park, Goodyear Tire & Rubber Co.

On the arrangements committee was W. B. Cheney, commercial department, Southern California Edison Co. Sponsors of the clinic were the following electrical groups among the 21 societies and associations: American Institute of Electrical Engineers, represented by T. M. Blakeslee, W. S. Moody, E. W. Morris, W. D. Howze, Thomas Noble; Electric Club of Los Angeles, by A. D. Brown, H. W. Howe, George N. Hawley; Electrical Maintenance Engineers Assn., by Glenn Farr, Nels Swanson, Howard C. Parks; Illuminating Engineering Society, by Urban L. Beh, T. H. Shephard, H. J. Chanon; Pacific Coast Electrical Assn., by Victor W. Hartley, Fred T. Schell. W. B. Chaney was one of the American Welding Society representatives.

Prior to the panel sessions, from 3:15 to 5:30 p.m. and later from 7:45 to 10:00 p.m., the afternoon program and dinner program, both general assemblies, were addressed by Dr. Rufus B. von KleinSmid, president of USC; Lieut. Maurice J. Joyce, chief of production division, Western procurement dist., Army Air Force; Watt L. Moreland, district manager of production service, WPB; Commander J. C. Arnold, USN, office of inspection of naval material; and B. C. Boulton, administrative engineer, Lockheed Aircraft Corp.

Other panels were on manufacturing equipment, welding, materials, fabrication, processes and personnel.

Certify Repairs

National Industrial Service Assn. announces a "Certified Repairs Plan" organized as a separate function of the association and invites electric motor industrial shops to join. The plan operates under a national certification board whose members are elected by delegates at the NISA conventions. Headquarters for the board are at 1523 Central Parkway, Cincinnati, Ohio, the office of the chairman, F. W. Willey. To obtain membership, only members of NISA may participate, and they must qualify in shop technique and quality of workmanship for a certification. Under the plan 150 bulletins have been issued containing information on how to improve shop and office operations. There is also an employee training course consisting of 54 lessons and a rewind data bureau which has collected over 15,000 polyphase rewind records and supplies data to the members about five times a week. An initial entrance fee of $50 is all that is required and there are no dues, the NISA treasury assisting in the operation.

PCEA Panorama — Edited by Mary Shoop

Who Am I?

I was born in Scales Mound, Ill. I was graduated from Iowa State College in 1904 with a degree of B.S. in electrical engineering, and immediately joined the General Electric Co. at Schenectady, N. Y., as a test engineer. I remained there until 1906, when I was transferred to the San Francisco district as salesman. In 1911 I was made manager of the supply department, to which was added in 1920 the management of the Edison lamp department. In 1923 I was appointed sales manager of the San Francisco office, and two years later was made in addition Pacific Coast manager of the merchandise department. In 1926 I was made manager of the San Francisco office. In 1936 a new General Electric district was formed consisting of California, Arizona, most of Nevada and the Hawaiian Islands; I was appointed manager, the position I now hold. I am also commercial vice-president of the General Electric Co. Who am I?

I have been vice-chairman of the Pacific Coast Electrical Bureau and chairman of its lighting committee. I continued my interest in electrical activities after the bureau was absorbed by the Pacific Coast Electrical Assn. I was president of the association in 1937-38, and am now a member of the planning committee. Who am I?

I was a leader in forming the San Francisco Electrical Development League, of which I am a past president and active member. I am a past president and vice-president of the Engineers Club of San Francisco, and am active in Community Chest and the California State Chamber of Commerce. I was a director of the Golden Gate International Exposition at Treasure Island in 1939. Who am I?

Other organizations which I have headed as president are the San Francisco Chamber of Commerce, Rotary Club and Sales Managers Assn. I am married and have two children. I live in San Francisco and my name is:
See Page 94.

War Conference

One-day meetings will replace convention

June 2 and 9 are the dates of the one-day PCEA meetings which are taking the place of the association's annual convention. The southern meeting will be held on Wednesday, June 2, at the Roosevelt Hotel, Hollywood, and the northern meeting at the Fairmont Hotel, San Francisco. Program subjects will be identical.

War Problem Conferences is the designation which has been given to the gatherings. They will be practical, down-to-earth consideration of the problems of the electrical industry at war, with a far-sighted look into the future in which electricity will be an even more essential element than in the past.

President S. E. Gates will preside at both of the meetings. Programs are being arranged to cover the following general subjects:

Business Development Section

Frank Angle, chairman
P. P. Pine, vice-chairman

1. A report and discussion on a national survey of availability of appliance repair parts. This will include results of the complete survey showing each manufacturers' status and comments, and a proposal of ways and means of supplying such shortages as the survey shows.
2. A report and discussion on appliance maintenance and personnel training, including activities in Los Angeles, San Diego and San Francisco.
3. Report of the committee now conducting a survey to determine the availability of electric water heaters, and a discussion of the possibilities of a universal tank.
4. "Light Up With Victory" program.
   (a) General discussion and rough outline of proposed set-up.
   (b) Discussion by utility lighting engineers.
   (c) Service clubs approach.
5. Discussion of the present condition of dealers.

Administrative Services Section

L. C. Rausch, chairman
F. C. McLaughlin, vice-chairman

1. Accounting.
2. Credits and collections.
3. Personnel and public relations.
4. Purchasing and stores.
   (a) Outline of the organization and functions of the electric utility surplus control committee.
   (b) Methods used by various utilities to identify certain items of materials and equipment in inventories.
   (c) A discussion of price regulations to clarify prices at which new and used materials and equipment may be sold or exchanged, with special reference to OPA price regulations 136 and 204.

Operating Economics Section

H. A. Lott, chairman
E. A. Crellin, acting vice-chairman

1. The economies effected by standardization and repetitive manufacture of equipment.
2. Savings in critical materials accomplished through increasing the capacity of existing equipment.
3. Wartime safety problems.
4. Personnel training under war time and restricted manpower conditions.

Maintenance Discussed

The second of a series of PCEA-sponsored meetings designed to bring together dealers and distributors for a discussion of mutual problems in appliance maintenance and repair was held at Eagle Rock on March 31. Thirty-five men were present, of whom approximately one-half were dealers from the area.

Discussion was directed mainly toward three aspects of the problem: the ability of the dealer to function profitably under present ceiling limitations, his ability to obtain necessary repair parts, and his ability to secure necessary manpower to service the increasing quantities of appliances needing repair.

As was the case with the first meeting of this type, held in Santa Monica, the principal discussion hinged upon the difficulties the dealer faces under the requirement that he turn in an old part before receiving a replacement. The distributors explained that this restriction was not of their creation but was required by the WPB. However, there has been a relaxing of the order with regard to certain items, and it is indicated that the order will

be further eased, which will simplify the problem considerably.

The meetings are valuable in the opportunity they afford distributors to obtain a firsthand picture of the difficulties dealers face in endeavoring to function as repair depots, and in giving dealers a chance to learn the distributors' side of the picture.

● PREPARATIONS for promoting the new version of the sub-standard appliance sales ordinance, recently revised by the code and ordinance committee, have resulted in an impressive collection of hazardous appliances that have been unwittingly purchased by the public. Around this array of "horrible examples" is being built a presentation talk which can be delivered to city councils, merchant groups, service and women's clubs.

Electriquiz

C. L. Westmann, station chief at the Southern California Edison Co. Big Creek power house No. 3, is the author of this interesting quiz. The answers are on Page 94.

1. What popular electrical appliance has almost continuous service, requires a minimum of power and delivers practically 100% performance?
2. The approximate power cost of operating an electric clock for one year is: a. 50c. b. $2.50. c. $5.
3. What hourly wages does the operator of a mechanical clock earn by reason of his elimination of the power cost for an electric clock?
4. How is the time of an electric clock regulated?
5. Considerable power in the West is generated from water which is stored in lakes or reservoirs. How much water must a power company store for a year for the average consumer?
6. How is water affected by its use for generation of electric power?
7. What particular value does snow have for the generation of electric energy, besides its water content?
8. Has any method been devised for the economical storage of electricity for commercial use?
9. What relatively common metal, which has good electrical conductivity properties but has not been generally so used, is being given consideration as a substitute for copper?

Meetings

Having cancelled previous traditional bi-yearly meetings at Del Monte, the Pacific Division, National Electrical Wholesalers Assn., has decided that war problems, particularly those relating to manpower, make it necessary to call a war conference June 17, 18 and 19 at the Santa Barbara Biltmore, according to R. A. Balzari, executive secretary. The meetings will not resemble those of the past, in that social activities, if any, will be limited and the entire industry urged to participate in discussion of basic problems confronting the wholesalers to aid them to do a more effective wartime service job.

Unit substations were the educational subject on the program of the Electrical Maintenance Engineers Assn. of Southern California at its April 21 meeting. William H. Schiek, General Electric Co., presented the subject with lantern slides for illustrations and stressed the savings in copper made possible by their use. Another attraction was Edwin H. Himrod, who had been imprisoned by the Japanese. He told of the *Japanese Invasion of Shanghai.*

Committees for the year were announced by President Walter A. Smoker as follows: dope sheets, Harry Schabbleman, Richfield Oil Corp., and Walter R. King, National Biscuit Co.; editorial, Henry Bush, Littlejohn-Reuland Corp.; educational, Oliver B. Anderson, Santa Monica Technical School; membership, Stanley S. Bradley, MGM Studios; program, Julien Davis, consulting electrical-mechanical engineer; social, Harry A. Simpson, General Electric Co. and Clarence R. Miller, Western Precipitation Co. The annual stag party was scheduled for Sunset Fields Club, May 8, at 7 p.m.

With the announcement of committee appointments for 1943, W. R. Volheye, president, Northwestern Section, International Association of Electrical Inspectors, likewise announced the dates for the Seventeenth annual meeting at Seattle, Wash., as Aug. 26 and 27. Committee appointments, including those on various articles of the National Electrical Code, were published in a pamphlet which was sent to all members by Secretary F. D. Weber, of Oregon Insurance Rating Bureau, Portland.

Because no new code is contemplated for the duration, the president continued the code and article committees of the past year, making changes only in the general committees. Chairmen of these are as follows: annual meeting, V. B. Wilfley, Seattle; articles of association and by-laws, A. M. McLean, Portland; associate *News-Bulletin* editor, Berkeley Snow, Portland; code clearinghouse, E. E. Lee, Seattle; educational exhibits, F. E. Symons, Portland; fire and accident prevention, S. E. Sanislo, Seattle; legislation, F. H. Murphy, Portland; membership, L. B. Johnson, Salt Lake City; public relations, S. E. Sanislo.

Russell D. Horning, manager, Seattle office, National Electrical Contractors Assn., on his return from a meeting at Washington, D. C., spoke of *My Impressions and Reactions to What is Going on in Washington, D. C.* at the April 5 meeting of the Electric Club of Washington in Seattle. Instead of finding Washington in a state of "dire confusion," he reported sincere representation from members of Congress. He was likewise impressed with the industry and labor 20-man Hoffman committee which is working on a plan to create and maintain a national income of at least $100 billion a year after the war to re-employ 56,000,000 workers. His observations on the immediate future of the construction industry were that construction would go down to a vanishing point within the next two years, but that the industry would carry the major share of the first few postwar years. His conclusion was that the real problem was a shortage of capable administrative manpower for the various administrative branches of the government.

Research in Plastics was presented to the Electrical Maintenance Engineers' Assn. of Northern California by Dr. George Brothers, U. S. Department of Agriculture, special research laboratory in plastics of Albany, Calif., on April 22. The meeting was held at Oakland at Bohemian Grove and entertainment furnished by the Oakland members.

At the previous meeting election of officers placed at the head of the organization A. F. Cazin, Otis Elevator Co., succeeding J. C. Cochran, Pacific States Savings & Loan Co. J. E. Stewart, City Hall, Oakland, was made vice-president and J. G. Hayes, American Can Co., re-elected secretary-treasurer. To the executive committee were elected J. C. Cochran; W. C. Heston, instructor, Samuel Gompers Trade School and W. C. James, Norton Wool Co.

Because it placed two of its members as speakers on a war production conference April 9 at the University of Southern California, the Illuminating Engineering Society, Southern California Section, held no April meeting of its own. IES speakers on the electrical equipment panel at the afternoon session were H. J. Chanon, General Electric Co., Lamp Department, who spoke on *Industrial Lighting for Maximum Production of War Materials*, and T. H. Shepherd, illuminating engineer, Los Angeles Bureau of Power & Light, on *Efficient Office Lighting for War Plants.* Because Frank T. Anderson, former secretary, has been transferred to Seattle, L. W. Luley, Westinghouse Lamp Division, was appointed secretary in his place.

Louis Ardouin, for several years secretary of the Electrical Contractors and Dealers Assn., San Francisco, and later with Columbia Steel, told the Los Angeles Electric Club, of which he was a former member, what he knew about Jap psychology. As a ranking amateur wrestler, he led a group of American athletes in 1938 to Japan and had an opportunity to meet many of the Japanese military officers and leaders. The March 29 meeting was addressed by John Delmonte, technical director, Plastics Industries Technical Institute, who spoke on *Plastics in the Electrical Industry.*

Puget Sound Chapter, International Association of Electrical Inspectors, heard Commissioner O'Neil, manager of the city of Tacoma's Lighting Department, speak on *Tacoma's Part in the Northwest Power Development* at its last meeting in March. Chairman Ray Larrabee exhibited a copy of the Japanese national code.

X-Ray in War Production was the subject of C. E. Boucher, vice-president of Industrial X-Ray Laboratories, Seattle, Wash., before the Portland Electric Club April 8. He discussed use of x-ray for checking the reliability of welds and strength of castings.

NEWS of the industry

PGE SEEKS COURT DECREE TO FORCE CONTRACT

Seeking court decree that would force Bonneville to execute a long-term contract for the sale of power to the company, Portland General Electric Co. has filed suit in the Federal district court. This is the latest step in the development of negotiations for such a contract between the company and the power administration extending over a year and a half.

The suit asks that the terms of a contract signed by the company Feb. 3, after certain deletions had been made, be declared binding upon the Bonneville Administration. These deletions pertained to provision that the company sell its Clark County, Wash., and Woodburn, Ore., properties within a specified period of time after receipt of demand from the Bonneville Administration, and another clause requiring the company to sell all its electric properties upon demand after a majority of the company's customers had formed one or more PUDs or had formed municipal projects.

As an alternative, the company asked the court to enjoin and restrain Dr. Raver, Bonneville Power administrator, from demanding or requiring that the company give an option for the purchase of any part of its utility properties or that the company agree to sell any part of its properties as a condition to the making of a power contract.

This followed another suit, which was filed early in March by the independent trustees of Portland Electric Power Co., seeking to clarify the authority of the Bonneville Administrator to give or withhold power contracts or to enforce purported moral obligations of private utilities.

The new complaint alleges that the administrator "did refuse to enter into any term power contract with the company unless the company should acquiesce in the arbitrary and unauthorized demands of the administrator that it agree to the sale of substantial parts of its utility properties . . . and the continuance of such arbitrary and unauthorized refusal of the administrator to negotiate and enter into a reasonably termed power contract with the company would work and is working irreparable injury to the company, in that the company

"(a) Would be and is unable to assure its existing contract customers of continued service;

"(b) Would be and is unable to assure the service of new customers;

"(c) Would be and is unable to forecast its operating expense and net earnings so as to determine proper customer rates;

"(d) Would be and is unable to accomplish a refinancing in reduction of interest charges; and

"(e) Would suffer and is suffering an unjustified reduction in the value of its utility properties."

In the light of this the company seeks to have previous negotiations involving a contract with unauthorized conditions deleted declared valid and that the administrator be enjoined and restrained from demanding that an option to purchase be given or that an agreement to sell parts of its property be included in any power contract.

USBR Reports 393,500 kw. Added in Western States

Power plants of the U. S. Reclamation Bureau accounted for 393,500 kw. of the total of 557,000 kw. of new power facilities added to systems in the 11 Western states in 1942, according to a study just made by Reclamation Commissioner John C. Page. Most of the capacity was in the Grand Coulee, Boulder Dam and Parker dam projects.

In 1943 the bureau will contribute 500,000 kw. of the 825,000 kw. of new capacity to be added. In 1942 bureau projects generated approximately 7 billion kwh. of the total of 31 billion kwh. produced in Western power plants.

Blackout

For seven days last month, citizens of Jackson, Wyo., lived the answer to the copywriter's hypothetical question: what would happen if the power went off—and stayed off.

A 10-ton rock, loosed from its mountain mooring, crashed into the main water conduit serving Jackson Power & Light Co.'s turbines April 5, and the lights didn't go on again until April 12.

While crews worked to replace the line, candles were rationed, schools were closed, meat was sold point-free to keep it from spoiling.

COLORADO RIVER COMPACT UP FOR STUDY AGAIN

Arizona's governor has signed a bill passed by the state legislature authorizing the negotiation of contracts between the state and the Secretary of Interior for delivery of all waters of the Colorado River available to the state under the terms of the Boulder Canyon Project Act. Upon successful negotiation of such a contract and its subsequent approval by the legislature in 1944, the state agrees conditionally to sign the Colorado River Compact.

The legislation still leaves Arizona's ratification of the 20-year-old Colorado River Compact up in the air, since action is contingent upon negotiation of a contract that must have future approval. Failure to accede to the provisions of the compact has cost Arizona its rights to large quantities of Colorado River water for irrigation and power generation, according to the governor. The original compact allocated 7,500,000 acre-ft. to the Upper Basin states—Colorado, New Mexico, Utah and Wyoming—and 8,500,000 acre-ft. to Arizona, Nevada and California. It further authorized the Lower Basin states to use all surplus waters pending reapportionment in 1963.

The Boulder Canyon Project Act not only recognized the compact as the law of the river, but also further divided the water between the lower basin states. It allocated 4,400,000 acre-ft. to California, 1,300,000 to Nevada and 2,800,000 to Arizona plus all the water of the Gila River within the state boundaries.

Power Lines in Northwest Leveled by Freak Winds

Freak winds of gale-like intensity whipped the Puget Sound area on the morning of April 23, leveling power lines in some instances and blowing branches and at times whole trees across lines in others. Service of Seattle City Light and Puget Sound Power & Light Co. was seriously affected. Emergency repair crews were organized and all off-shift employees called back to duty.

Intensity of the storm and extent of the damage can be gaged by operations on the Puget Sound Central District trouble call switchboard where two operators normally handle all complaints. After the storm 12 operators were required to take incoming calls.

"Tomorrow may be too late—do it today!"...CHECK UP!

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WARTIME restrictions make copper products hard to get — this includes electrical wire and cable. It will pay you to protect what you have.

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If you follow this free plan you not only help yourself, but more important, you help the war effort. This manual provides a practical automatic method for complete analysis of circuits and equipment... uncovers potential weaknesses ... methods for correcting them... with charts to enable quick periodic check-ups.

NOTE: Through this Preventive Maintenance Plan you may uncover the evidence necessary to obtain an "emergency repair priority." This is explained fully in the plan book. 43227

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WWP STATES CASE AGAINST FPC "CARRIER" ORDER

Evidence to show that it would be both more efficient and less expensive to the government for Washington Water Power Co., rather than the Bonneville Power Administration, to serve a new Army hospital and camp pumping station near Seattle was given the Federal Power Commission last month by the company. The hearing was in response to the utility's request for a public review of FPC's precedent-setting order directing Washington Water Power to act as a "common carrier" in transmitting Bonneville energy to serve the two loads.

Much of the company's evidence had to be put into the record in the form of "offers of proof" rather than directly because of rulings by Chief FPC Examiner Frank A. Hampton. The commission, in granting the request for a hearing, plainly indicated that it considered the proceedings a waste of time and that it did not intend to change its decision.

All testimony regarding federal income tax payments by the company, for instance, were excluded by Examiner Hampton. After this decision, Company Counsel Allen Payne put into the record an "offer of proof" that Kinsey M. Robinson, company president, was on the witness stand to testify that the net cost to the government for service by his system would be $4,128 annually cheaper for the two loads than under the contract between Bonneville and the Army. The saving is computed, Payne stated, by deducting the company's 42% federal income tax payments and the cost of Bonneville "dump" power which the utility would purchase to conserve its own water reservoirs.

In addition to the monetary savings, Payne, in another "offer of proof" pointed out that the company's proposed arrangement provided service without using the firm power supply of Bonneville, thus releasing this capacity "to make bullets." Pressed by Examiner Hampton to get "down to this case," Payne asserted:

"That's just what we're trying to show. We would take power which Bonneville can't use for three months and give them power when they need it. It's not in the best interests of the public to break up this mutual cooperation arrangement and let Bonneville take over this contract and use firm power which could be used to make bullets."

Payne also pointed out that Bonneville sells energy to various public power systems and agencies which resell it at higher rates. This was introduced to show "discrimination" by FPC against private power systems which the attorney said violated the President's directive instructing the FPC to arrange for the "cheapest" power for war loads, without discrimination as to system ownership.

All of Robinson's testimony outlining the specific operations of the Northwest power pool and how Washington Water Power would take Bonneville energy which otherwise would be wasted and "process" it into firm power by saving its own water storage for later use was given in an executive session because of wartime restrictions on power capabilities and loads. Newsmen were permitted by Hampton to remain at the hearing but the record was marked confidential.

FPC Charged on House Floor With "Collusive Knowledge"

Rep. J. William Ditter, Pennsylvania Republican, has charged the Federal Power Commission with having "collusive knowledge" of a "dummy political corporation, the Clark County (Wash.) Public Utilities District," which "sits between two other federal agencies and collects $50,000 a year for rendering absolutely no service."

The Bonneville Power Administration, selling power wholesale to the PUD, and the Federal Housing Administration, buying it retail from the PUD, also were charged with "collusive knowledge" of the situation. The charge was denied by FPC and by two spokesmen for the PUD.

In addition, Ditter charged FPC with failure to carry out the President's directive of October 22 which required FPC to see that federal establishments and war contractors get their power from the cheapest feasible source, using competitors' facilities to do so if necessary. FPC denied this charge with the statement that the contract in question was made five months before issuance of the directive and that proposed contracts must be reviewed before contracts which antedated the order.

Ditter countered the denial with a statement that his "most important charge" was that FPC refused to consider federal taxes paid by private companies in determining the cheapest source. This accusation, he said, was paramount to anyone interested in private enterprise. He added that since FPC's denial made no mention of this fact, "I interpret this omission as tacit acceptance of this charge."

Ditter's blast followed an FPC hear-

ing on the Washington Water Power Co.'s request for public review of the FPC order directing the company to transmit Bonneville Power as a "common carrier" to an Army hospital and camp pumping station in the company's territory. The company's attempt to introduce evidence showing that its rates would be cheaper than those offered by Bonneville if its federal taxes were considered was disallowed by the examiner.

Ditter further assailed FPC for its willingness to "violate its own rules and to vitiate the contract already entered into by the parties," (Bonneville and Washington Water Power) basing the accusation on FPC's common carrier order.

The hospital load, Ditter said, totaled 700 kw., the camp load, 500 kw. Previously, Ditter charged on the House floor, FPC has established as "a reasonable minimum for renegotiation loads in excess of 1,000 kw." Thus, he explained, it violated its own rules by the common carrier order affecting contracts smaller than 1,000 kw. Further, Ditter charged, Bonneville and Washington Water Power had an exchange contract which provided that Bonneville was to take war loads of more than 750 kw., leaving smaller loads to the company. This agreement was vitiated by FPC's common carrier order, Ditter alleged.

Ditter paid incidental tribute to the electric power industry, stating:

"The (Presidential) order was singular only in that electric power is the one vital war production commodity which has not been rationed, in which there has not been a shortage and which has actually decreased in price to the consumer since the war began. This, despite the fact that on as many as 11 different occasions, FPC erroneously surveyed power resources of the nation and erroneously predicted shortages which failed to appear."

Rep. Fred Norman, Washington Republican, took the House floor to defend the Clark County PUD, located in his district, and denied allegations that it was a "political parasite" or "dummy." Norman explained that the commissioners who organized it had been re-elected to office after its establishment, and termed this a "re-demonstration of confidence." He pointed out also that Bonneville wholesales power to other Washington state PUDs and to private companies as well, all of whom retail it to the public.

"There is nothing wrong in all this, and there certainly is nothing wrong with the fact that both the public and private power retailers make profits," Norman declared.

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For insulating all types of coils. Made in several combinations. Recommendations furnished for specific operating conditions.
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Round, oval, square, rectangular and special shaped washers or pieces for insulating arc lamps, grid rheostats and similar apparatus.

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DIRECTING electrical traffic, guiding current along its predetermined path, keeping electrical equipment on the job to turn out more of the nation's war goods . . . that's the way these *Micanite Products* can help you.

Always the pioneer in developing tougher, more serviceable mica products, we have ample raw materials and production facilities today to keep an adequate supply of the best quality built-up mica insulation available for the increased requirements of all branches of the electrical industry.

Let us know your requirements. Send specifications or blueprints for prompt action on any or all of the products listed.

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We are sending samples or blueprints of our_____

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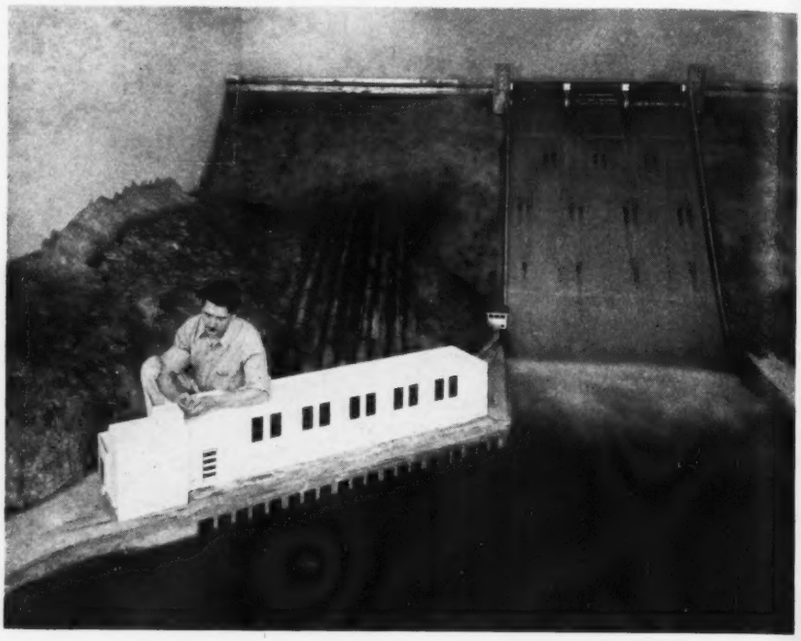
DITTER CHARGES DENIED BY POWER COMMISSION

That the charges of Representative Ditter "are utterly without foundation and it is apparent that he was misinformed at the time he made his statement" was the answer forthcoming from the FPC following the charges on the floor of the House of Representatives that the FPC had tried to "gag" a hearing. The FPC statement denying all charges said, in part:

"In its order setting hearing at the request of The Washington Water Power Co., the commission provided that the hearing should be public 'except insofar as the presiding officer may deem otherwise appropriate in view of the war aspects of the subject matter,' and no objection to the order was made by the company. Accordingly when, in the course of the hearing, testimony and exhibits showing in detail the facilities, operations and war industries served by The Washington Water Power Co. and the several other member systems of the giant Northwest power pool were about to be introduced, the trial examiner recessed the hearing and directed counsel for the Water Power company and counsel for the commission to report to him, after conference, their recommendations with respect to closing the hearing to the general public in the light of the testimony and exhibits about to be offered. . . .

"All press representatives of both news services and trade journals who had been in attendance at the public session were expressly permitted by the trial examiner to remain, as the transcript of the proceeding shows. This procedure was thoroughly acceptable to the press representatives, who expressed the opinion that the testimony and exhibits to be offered during the closed session appeared to be of a character that could not be published under the voluntary censorship code administered by the Office of Censorship.

"Representative Ditter's charge of 'collusion' with reference to the Clark County contract is equally without basis. The only connection that the Federal Power Commission has had with this contract, which was entered into on May 24, 1942 or five months before the President's directive of October 22, 1942, is that the contract has been filed with the commission by the Federal Public Housing Authority together with hundreds of other existing contracts for the supply of power to war plants and establishments of other procurement agencies. At the same time the commission has received from the procurement agencies numerous proposed contracts for service to new war plants and establishments, which have an emergency character. Their review must necessarily be given precedence over that of existing contracts. All contracts for power subject to the President's directive will be reviewed as rapidly as possible."



This hydraulic model of the central section of Shasta dam indicates what flow conditions will be under actual operation. Scale of the model is 1 to 68. The power house, shown in miniature, will be completed this year

Oregon Voter Adds Comment on Ditter Blast of FPC

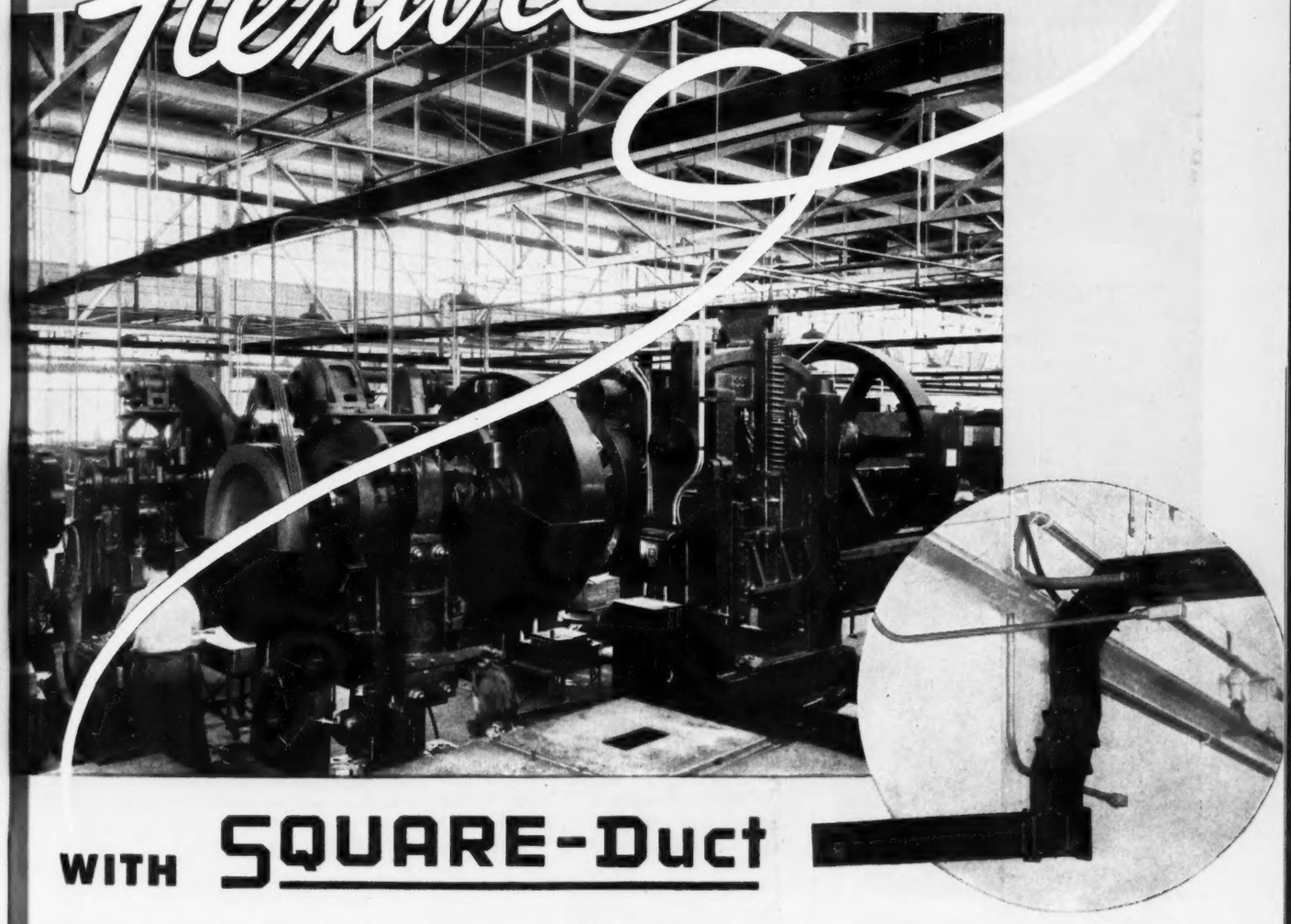
Commenting upon the charges of Congressman Ditter respecting the FPC hearing of the Washington Water Power case, with the attendant references to the Clark County PUD "dummy" contract, the *Oregon Voter*, outspoken critic of BPA, said:

"To condense this resume it remains only to point out the ridiculous inconsistency of the position in which the involved federal agencies find themselves. At Spokane, they demand elimination of the power company as a middleman—though its offer means lower energy cost; at Vancouver, they have sponsored the 'political dummy' PUD set-up as a middleman. At Spokane, they insist there must be no intermediary between the federal agency producing cheap power and the federal agency using that power. At Vancouver, they have whole-heartedly encouraged the interposition of the unneeded PUD between the federal agency producing the electrical energy and the agency using it. At Spokane, there is the pretense—with no foundation in facts—that elimination of the middleman will mean cheaper energy for federal agencies; at Vancouver, there is 'collusive knowledge' that cost of energy used by the federal housing project is boosted some $50,000 to $60,000 a year, this 'gravy'—as Representative Ditter called it—flowing into the treasury of the superfluous PUD."

● A LICENSE or occupation tax assessing a 2% fee on the business of selling or furnishing electric light and power has been set up in an ordinance passed at first reading by the city council of Bremerton, Wash. The ordinance requires that after July 1, 1943, no person shall engage in or carry on a business of furnishing electricity or power without first having obtained from the city a license to operate. Puget Sound Power & Light Co. is the only such business in the city. Initial tax payment under the new ordinance becomes due July 1.

● FPC last month denied California-Oregon Power Co.'s request for a rehearing on its order determining original cost of the utility's plant and disposing of $4,815,722 in what it termed "write-ups" and excess cost of acquisition. In refusing a rehearing, the commission said the company's request did not raise new questions of fact or of law.

Flexible POWER DISTRIBUTION



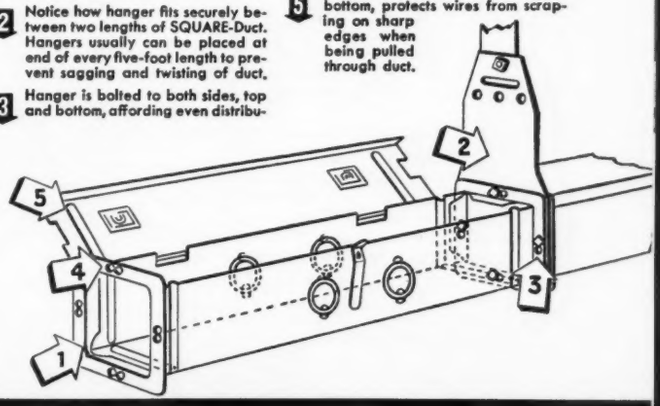
WITH SQUARE-Duct

SQUARE-Duct offers flexibility for the locating and relocating of machines which is not obtainable with solid conduit. Knockouts every three inches make it possible to connect through short runs of conduit. Since SQUARE-Duct can be installed at uniform height, it is often possible to reconnect the old conduit at another point—a valuable time and material saver.

Notice, too, in the illustration at the upper right, how a wide variety of standard elbows and fittings makes it extremely simple to run SQUARE-Duct around pipes, beams, corners, and into normally difficult locations.

The initial cost of SQUARE-Duct is practically the same as for conduit wiring. Installation cost is substantially lower. Write for Bulletin 6000 which gives complete details.

1. Drawn collar affords secure support for the duct and automatically aligns each length to prevent twisting. It also serves as a stable connection to the adjacent length equipped with a similar collar.
2. Notice how hanger fits securely between two lengths of SQUARE-Duct. Hangers usually can be placed at end of every five-foot length to prevent sagging and twisting of duct.
3. Hanger is bolted to both sides, top and bottom, affording even distribution of weight and offsetting any tendency to twist.
4. Double keyhole screw slots help in making alignment adjustments.
5. Emboss on cover, both sides and bottom, protects wires from scraping on sharp edges when being pulled through duct.



CALL IN A SQUARE D FIELD ENGINEER

If you have a problem which involves electrical control or distribution, you're welcome to the counsel of the nearest Square D Field Engineer. He is in constant contact with plants of every kind and size. He studies methods and applications with the idea of simplifying new jobs or doing old ones better.

There are Field Engineers in Square D branch offices in 52 principal United States and Canadian cities. Their services are dedicated to solving industry's war and postwar electrical problems.

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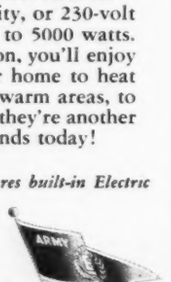
In Army, Navy camps and war plants these economical Thermador Fan-Type Electric Heaters are providing comfort and convenience.

With a flip of a switch, these double-purpose units heat in winter, circulate cooling air in summer. Flameless, fumeless Thermador Heaters are only available on priority orders in portable or built-in types for use on 115-volt A.C. service, 1650 watts capacity, or 230-volt A.C. in capacities up to 5000 watts.

When victory is won, you'll enjoy a Thermador in your home to heat cool corners, to cool warm areas, to dry clothes and hair—they're another reason to buy War Bonds today!

Thermador also manufactures built-in Electric Heaters, Electric Ranges, Electric Water Heaters, and Small Transformers.

Write today for Catalog EW5



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$700,000 RATE CUT ASKED IN COMPLAINT AGAINST PGE

Formal complaint against Portland General Electric Co. demanding rate reductions totaling about $700 000 for this year was filed March 31 by Ormond R. Bean, State Public Utilities Commissioner for Oregon. The complaint charged discrimination in the company's rates as between communities served, required establishment of a fair rate base, proposed a fair return to the company on that base, and demanded elimination of excess earnings above a fair return.

One provision quite new to rate proceedings in Oregon was the attempt to apply the "recapture" clause in the utilities' code. The complaint demanded the impounding of $700,000 in alleged excess earnings for 1942 in a fund which would react to the benefit of the utility's customers. Hearing on the complaint is to be scheduled soon, according to Commissioner Bean.

In a petition for intervention, the independent trustees of the company asked that the hearing be postponed until after May 25 because of the absence of their attorney from the state.

Arizona Commission Opens Hearing in Regulatory Case

Whether the Salt River Valley Water Users' Assn. is subject to jurisdiction of the Arizona Corporation Commission as regards rates and service will be determined in an action which commenced May 4. The commission ordered the association to appear on that day and show cause why its electric rates should not be regulated.

Action to place the cooperative association under commission regulation stems from a resolution passed by the last Arizona legislature. During a legislative investigation of rates there was considerable controversy over the scheduled charges of the water users' organization.

The present action has the approval of the association's officers who have declared that they will welcome a decision as to the proper regulatory body having supervision over its rates.

● Utah Power & Light Co.'s proposal to merge and consolidate the facilities of the Utah Light and Traction Co. and the Western Colorado Power Co. into the parent organization has been placed before the Federal Power Commission in an application for approval of the plan.

It's moving day for this 4,000-kw. steam turbine generating set at the Southern California Edison Co. Long Beach steam station. Time and labor were saved by jacking up the set and moving it with foundation, supporting steel and all connections intact. The set, with foundations, weighs about 300,000 lb. It was moved to make room for an 80,000-kw. unit

PUD Prepares to Take Over West Coast Properties

Largest sale of PUD bonds in Oregon to date was consummated early in April when John Nuveen & Co. took $800,000 of Central Lincoln PUD revenue bonds at 98.125 plus interest from July 1942.

The proceeds of the sale will go for the purchase of West Coast Power Co. properties in Lincoln, Lane, Douglas and Coos counties, Oregon, for $735,000 with the balance to be used as working capital. The net interest cost to the district will be 3.06%.

Central Lincoln District comprises 18 square miles in and around Newport, Ore. The West Coast company properties it is acquiring serve more than 5,000 customers in four counties. A Supreme Court decision recently indicated the validity of a PUD serving customers outside its territorial boundaries.

The PUD, which expects to effect the purchase of the company's properties within 30 days, has indicated it will retain the company's operating personnel.

EP&L ASKS COURT REVIEW OF SEC DEATH SENTENCE

Electric Power & Light Corp., holding company in the EB&S group which controls Idaho Power Co. and Utah Power & Light Co., has petitioned the U. S. Circuit Court of Appeals at Boston for a review of the SEC order calling for its dissolution. Under the death sentence clause of the Public Utility Holding Company Act of 1935, the SEC has ordered the company to dissolve.

In seeking that the order be set aside, the company's brief contends that such a penalty is not authorized by the act and is contrary to the intention of Congress in enacting such legislation. The U. S. Supreme Court has ruled on the registration phase of Section 11 of the act, the part under attack in the present case, but has never passed upon the constitutionality of the death sentence interpretation.

The brief contends also that the SEC is seeking to penalize Electric through the dissolution order because it alleges that the EB&S system does not conform to the act. "The bombsight of the SEC is obviously focused on the Bond and Share system; the bomb explodes on the Electric system," the brief states. It holds further that the SEC is powerless to force the 24,000 public owners of Electric's stock who are outside the company set-up to surrender their share in the dissolution of the company. The public, other than Bond and Share, owns a total of $514,000,000 of securities of Electric Power & Light and its subsidiaries.

Court Denies New Trial in Property Valuation Case

Snohomish (Wash.) PUD has been denied a motion for a new trial in a suit to establish value of property operated by the Puget Sound Power & Light Co. in the district. Federal Judge John C. Bowen, who presided over the seven-week trial, in which the PUD was ordered to pay the power company $9,500,000 if it takes over the latter's properties, rejected the company's motion for new trial.

Although this is the fourth county district to go to trial, it is a matter of record that none, so far, has acquired any of the company's properties under one of these awards. The first trial was that of Whatcom County in 1940, and a year ago the tri-county trial was held involving Thurston, Lewis and Cowlitz counties. After the jury verdicts and the entries of judgments, the districts hold elections to decide whether to accept or reject the judgments.

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Strip for Action! Strip made from WILBUR B. DRIVER CO. special alloys! Strip that has so many essential war uses! As it is rolled through their mills, day and night, we know it will do its part in flattening the Axis!

Consult us for your special alloy requirements in rod, wire, ribbon and strip—both hot and cold rolled.

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LLOYD STARTERS hold first place for efficiency and long life wherever 100-watt lamps are used. They have longer life . . . start more surely more times.

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OWU ORGANIZED UNDER FIVE SUB-DIVISIONS

The Office of War Utilities in the War Production Board has been organized into five policy branches and five administrative divisions each handling the affairs of a specific utility field under OWU's jurisdiction.

The agency's organization is "vertical" in the flow of authority, with each of the sub-divisions reporting directly to Director J. A. Krug and Deputy Director Edward Falck. The five policy branches are Research and Statistics, headed by Harry Miller; Materials Control, which handles policy and procedure on CMP and allocation of materials under Charles F. Weiler; Fuel and Allocations, under William A. Lyons, Inventory Control, under Charles E. Kohlhepp, and Administrative, headed by James A. Barr. These branches operate horizontally in all utility fields under OWU on matters pertaining to policy.

The administrative divisions are Power, Natural Gas, Manufactured Gas, Water and Communications. Each of these execute the OWU policies in their respective fields and develop specific policies and procedures applicable to their assigned branch of utility service. The Power Division, under Barclay J. Sickler, former deputy director of the old WPB Power Division, is divided into four sections each reporting directly to Sickler and, through him, to Krug and Falck. This organizational set-up for power is much the same as it was in the old power division. The four sections are power supply, of which J. E. Moore is chief; materials distribution, headed by Wade N. Edmunds; allocations (rationing and integration), under N. Knowles Davis, and equipment production, under Walker Cisler. Only new man in this group is Davis, who formerly was assistant to Lyons.

Priority Rating Granted For "Farmstead" Wiring

Farmers whose premises are eligible for connection with a power distribution line under order U-1-c have been assigned an automatic AA-3 rating for "farmstead" wiring.

Farmstead wiring is defined as "on-the-site" wiring, fixtures and accessories purchased by the farmer to connect the terminal of the utility's facilities with the points of use. It does not include wiring used exclusively for household lighting, and it may not include more than 75 lb. of non-ferrous metal.

Weighing 62 tons, this "spider" arrived recently at Grand Coulee dam, where it will form part of the rotor for one of the 108,000-kw. machines being installed there. To permit passage through tunnels and across bridges along the route, the unit was mounted on an under-slung freight car and some spokes were made shorter, with extensions to be added when the machine is assembled in the power house. (USBR photograph)

BOSTON FIRM EMPLOYED ON NISQUALLY PROJECT

Employment of the Boston engineering firm, Charles T. Main Co., to assist Chief Engineer J. V. Congwer with the second Nisqually power development was approved last month by the Tacoma city council. The council also decided to accept an offer by the same firm to conduct the projected investigation into causes underlying the increase in cost estimates of the development.

Last year, the council approved an increase from the original $11,000,000 estimate to $14,000,000 on the grounds of wartime conditions. Approval of an additional increase which would bring the project cost to $17,000,000 has been held in abeyance pending an investigation by "outside engineers."

The Main company's service will cost $1,250 a month. The council has stated it will require a progress report on the project at least twice monthly and has instructed Utilities Commissioner R. D. O'Neil to file with the council, before the engineering firm starts work, a report on the percentage of work completed to date and expected final completion.

Southern California Edison Purchases Fontana Power Co.

Purchase of the Fontana Power Co. by the Southern California Edison Co. was approved March 16 by the California Railroad Commission.

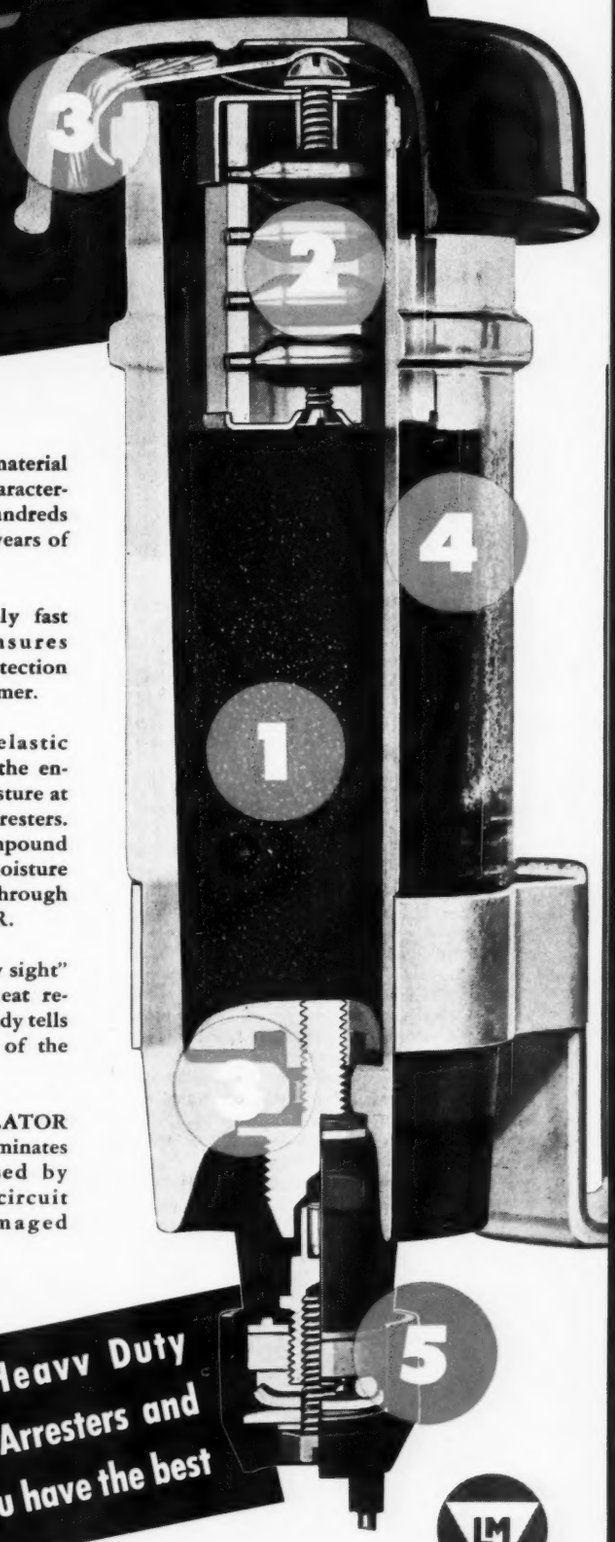
The one Fontana plant is located about four miles northeast of the town of Fontana, and has an operating capacity of 1,900 kw. or 2,400 kva.

In addition to the plant, Edison purchased the distribution transformers of the Fontana company, supplying customers with a total capacity of about 6,500 kva.

Incorporation of the Fontana company into the Edison system does not increase the Edison's generating capacity. Since the Fontana plant was built 26 years ago, Edison has been purchasing all energy generated in excess of the needs of Fontana's customers, whom the Edison company is continuing to serve. The Fontana Union Water Co. is the largest. It was to meet the huge irrigation power needs of this company that the Fontana Power Co. was organized in 191

● CONSTRUCTION of new section drydocks in Pacific Coast shipyards will entail considerable electrical equipment. Contracts for 18 sections involving control panels, circuit breakers and other items totaled $280,00

L-M *Gives you everything you should have in a* LIGHTNING ARRESTER



In 1943, more than ever before, you want and need the most reliable protection for your lines — to avoid outages and breakdowns, to maintain, with less help, uninterrupted service.

L-M Heavy Duty Lightning Arresters give you not merely what you *need* in Arresters, but what you *should have.* In an L-M Arrester you get all the features you expect in a good arrester and extra features which give you added protection and convenience.

Years of actual service on the line, as well as most comprehensive laboratory tests, have established conclusive proof that L-M Heavy Duty Lightning Arresters provide absolute protection, long trouble-free life and elimination of feeder lock-outs and phase grounding due to damaged arresters.

HERE'S WHAT YOU GET IN L-M LIGHTNING ARRESTERS:

- ***HIGH SURGE CAPACITY***
- ***LOW IZ DROP***
- ***MOISTURE-PROOFNESS***
- ***PERMANENCE OF CHARACTERISTICS***
- ***VISUAL-INSPECTION GLASS BODIES***
- ***THE ISOLATOR***

1. L-M valve material retains its characteristics after hundreds of surges and years of service.

2. Electrically fast ladder gap insures maximum protection to the transformer.

3. Double elastic seal prevents the entrance of moisture at top of L-M Arresters. Elastic and compound seals prevent moisture from entering through the ISOLATOR.

4. A "test by sight" through the heat resisting glass body tells the condition of the L-M Arrester.

5. The ISOLATOR (Pat. Pend.) eliminates outages caused by grounding of circuit through damaged Arrester.

Use L-M Heavy Duty Lightning Arresters and be sure you have the best

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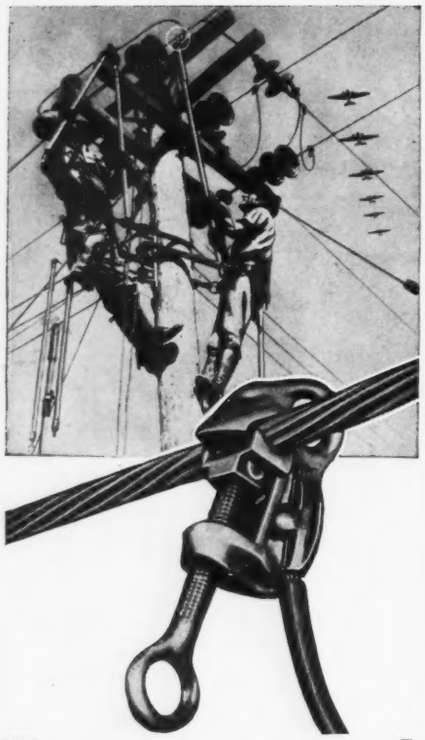
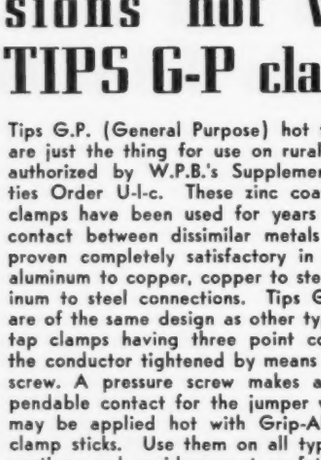
LINE MATERIAL COMPANY



Tap new steel conductor extensions "hot" with TIPS G-P clamps

Tips G.P. (General Purpose) hot tap clamps are just the thing for use on rural extensions authorized by W.P.B.'s Supplementary Utilities Order U-l-c. These zinc coated bronze clamps have been used for years to form a contact between dissimilar metals and have proven completely satisfactory in service on aluminum to copper, copper to steel or aluminum to steel connections. Tips G.P. clamps are of the same design as other types of Tips tap clamps having three point contact with the conductor tightened by means of the eye screw. A pressure screw makes a tight dependable contact for the jumper wire. They may be applied hot with Grip-All or other clamp sticks. Use them on all types of connections and avoid present or future service interruptions.



CONSULT THIS BOOK

A·B·CHANCE CO. CENTRALIA MISSOURI

EDISON GUARD FORCE IS ANSWER TO WAR NEED

The war's demands for increased plant protection are being met by the Southern California Edison Co. in a comprehensive program that has earned for its guard force the designation by Army officers as one of the best auxiliary military police units in California. Matt Hynes, Edison chief special agent, heads this activity.

An Edison guard is chosen carefully to meet high requirements of proficiency in the use of firearms, and for mature judgment which enables him to keep his head in an emergency. Experience in police or patrol work is desirable.

Thorough and continuous training prepares the guards for their important job. This instruction is given on company time, mileage is paid, and ammunition is furnished.

Range practice is required at least once a month. This is offered at five Southern California police ranges and is under the direction of Howard Reineman, Edison range instructor, assisted by G. H. Moore and Don Dunbar, special agents, who also carry on shell reloading operations in connection with this work.

The Edison guard force has been made auxiliary military police, and is one of the largest units of the kind in the West. Men are receiving one hour a week of instruction under Army officers on the following points:

1. Orientation and articles of war.
2. Military courtesy and customs of the service.
3. Defense against air and parachute attack.
4. Interior and special guard duty.
5. Markmanship, hand grenades, pistol, riot club, shot gun and tommy gun.
6. Personal encounters.
7. Military police organization.

This instruction is offered at a number of central points, and constitutes a 20-hour course. When the present course is completed, similar training will continue for the duration.

According to Hynes, the extensive training is resulting in highly efficient protection of vital properties, and the men are taking great interest in it.

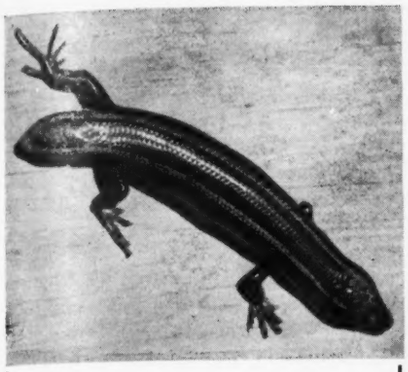
Celebration to Mark Return Of Light to West Coast

San Francisco will signalize victory over the Axis powers with a mammoth "When the Lights Come on Again" celebration. The plan, sponsored by the Chamber of Commerce, is being worked out by an executive committee directed by Ted Huggins, Standard Oil Co. of California.

Tentative proposals for celebrating the moment when lights are rekindled up and down the Pacific Coast on the day of victory have been made and actual shaping of the plans is in the hands of an executive committee representing all phases of civic, commercial, religious, educational and military life in the community. O. R. Doerr, PG and E general sales manager, is chairman of the lighting subcommittee.

● SEATTLE's city council has authorized the hiring of 90 engineers and aides for the City Light project to increase the height of Ross Dam. The council has approved plans of Eugene R. Hoffman, City Light superintendent, to operate the construction work on an around-the-clock basis, seven days a week, the men working 48 hours a week, with time off for any in excess.

Edison guards swing along in a snappy military drill under the direction of Lieut. C. L. Brantner, C.M.P., left



Definitely in the classification of things we'd rather see than be is this two-headed lizard found by D. P. Lamb, Northwestern Electric property agent, on the company's Victory Garden tract in Portland. Its home now is a goldfish bowl in the engineering department. Trial and error has revealed that two-headed lizards eat just one item—angleworms

Western REA Projects Are Reinstated by WPB Order

Four Western REA projects were among the 32 reinstated by the War Production Board last month, following examination of a "stop" order issued in July 1942. Deciding factors of the reinstatement, according to WPB Chairman Donald M. Nelson, were that the 32 projects will permit electric service to 6,700 farms and that most of the necessary material already is on hand or can be secured from excess stocks. The 32 projects varied from 50 to 89% complete.

The four Western projects are Intermountain Rural Electric Assn., Jefferson County, Colo., 114 miles; Clearwater Valley Light & Power, Nez Perce County, Idaho, 57 miles; Douglas Electric Coop., Oakland, Ore., 15 miles; Columbia County Rural Electric Coop., Wash., 64 miles.

● HOLY CROSS ELECTRIC ASSN., Basalt, Colo. will benefit to the extent of $175,999 and CLALLAM COUNTY PUD, Port Angeles, Washington, will receive $120,000 in a six-state rural electrification project approved last month by the Department of Agriculture. Total allocations for the six states were $679,000.

● CONSTRUCTION of a 110-mile, 66-kv. line from Emmett to Yellowpine in Idaho will be done by the Morrison-Knudsen Co., Inc., according to C. J. Strike, president of Idaho Power Co. The line is to supply power for additional mineral production.

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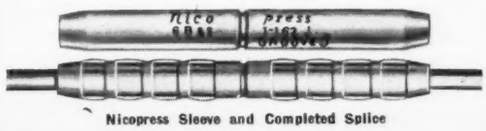

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PEOPLE
made this news

Westinghouse Realigns Pacific Coast Staff

Westinghouse Electric & Mfg. Co. last month realigned its Pacific Coast district, announcing personnel changes affecting the manufacturing and repair department, the lamp division and the Los Angeles and Phoenix Ariz. offices.

Walter G. Willson for the past 18 years Westinghouse manager at Phoenix was named Los Angeles manager to succeed A. J. Bronold. Bronold was appointed assistant to B. W. Clark, vice-president in charge of sales, and was transferred to headquarters at

Butcher

Pittsburgh, where he will attend to general marketing policies of the company.

Willson, a native of Bozeman, Mont., joined Westinghouse at East Pittsburgh in 1913 and has served in various capacities at Cincinnati, Tucson and Los Angeles, as well as at Phoenix.

Succeeding Willson at Phoenix is Howard S. Warren, of Glendale, Calif., Westinghouse application engineer at Los Angeles for 21 years.

Charles A. Butcher was transferred from Pittsburgh to the Pacific Coast as manager of the company's district manufacturing and repair department. With headquarters in Emeryville, Calif., he will supervise activities in all or parts of 11 Western states, Alaska and Hawaii.

Manager of the manufacturing and repair department in the Los Angeles area will be Frank H. Robb, who comes to the West Coast from Springfield, Mass. He succeeds Charles G. Yarbrough, who retired following 47 years with Westinghouse and 31 years in the Los Angeles area. With Westinghouse since 1919, Robb has served in the company's automotive division at Pittsburgh, Chicago and Springfield and in the service sales department at Boston, Bridgeport and Springfield.

In the lamp division, changes were made in the Los Angeles, Seattle and Salt Lake City offices. Gilbert F. Hain, for 17 years manager of the lamp

Willson

division at Seattle, was transferred to Los Angeles as division manager there, succeeding Bert R. Deleray, resigned.

Appointed to the post of Seattle manager for the lamp division was Frank T. Anderson, formerly application engineer in the Los Angeles office. Anderson was at one time assigned to commercial engineering work at the lamp division factory in Bloomfield, N. J., and served for 12 years as representative in Huntington, West Va., before being transferred to the Pacific Coast in 1937.

William T. Fauber was transferred from Salt Lake City to Los Angeles as application engineer replacing Anderson. Fauber has served the company's electric appliance division at Butte and San Francisco.

● THOMAS MARTIN, city electrician at Vancouver, who according to the retirement law would retire May 15, may be retained owing to war conditions, it is reported from British Columbia. Martin joined the electrical department in Vancouver 30 years ago as a journeyman in the street lighting branch and eight years ago became head of the department. It is under his instruction that the ARP fire alarm systems have been organized.

McKee Given Important Post In Rubber Development Corp.

Paul B. McKee, president of Pacific Power & Light, and Portland Gas & Coke companies, Portland, has been appointed vice-president and member of the board of directors of the Rubber Development Corp., a newly formed RFC subsidiary, which has taken over all phases of the natural rubber program in this country under rubber director, William M. Jeffers.

The Rubber Development Corp. has assumed the problem of getting natural rubber from the upper Amazon jungles of Brazil. McKee's background of experience in Brazil, where he spent six years operating an electric utility system before coming to Portland in 1933, particularly qualifies him for this new position.

McKee has been in recent months a special representative of the Metals Reserve Co., also an RFC subsidiary, procuring critical metals from Brazil. His services are being contributed to the government by the companies he heads in Portland.

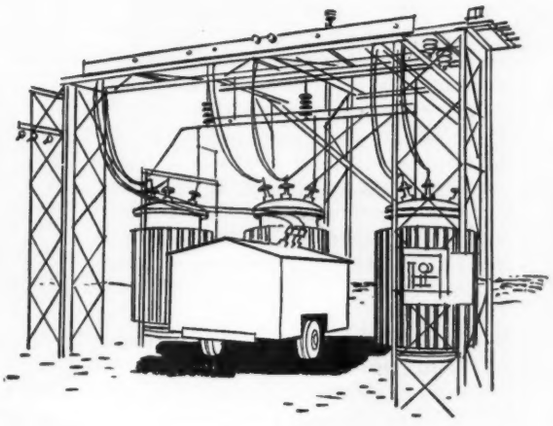
Young Elected President of BC Radio Technicians

E. Young has been elected president of the Victoria branch of the Association Radio Technicians of British Columbia. He succeeds J. Allison. D. Banfield has been elected vice-president, M. Warnock, secretary, H. Linnell, treasurer, and G. Ball, recording secretary.

In reviewing general conditions in the industry in Victoria at the seventh annual meeting, Allison stated that all service shops were now working to full capacity. He attributed this to the large number of radio technicians who had joined either the armed forces or war industries and the great increase in the number of radio sets in use and the growth of the population of the Greater Victoria area. The retiring president also touched on difficulties encountered securing delivery of repair parts.

● R. E. JERAULD assistant manager of General Electric's Los Angeles office and a member of the company organization since 1905, died recently in Los Angeles. Born in Providence, R. I., Mr. Jerauld was graduated from Throop Polytechnic in 1902. Starting with General Electric at Schenectady, he was sent to Phoenix, Arizona as resident agent and in 1925 was named manager at Phoenix. He was appointed assistant to the Los Angeles manager in 1930. He had been an associate member of AIEE since 1921.

MORE KILOWATTHOURS FOR VICTORY



STAND-BY TRANSFORMERS RELEASED

...by portable capacitor bank

A leading public utility has solved the problem of increased transformer capacity with a mobile capacitor unit. With a large number of delta-connected transformer banks serving power users with lagging power-factor loads, this utility was faced with the universal problem of supplying spare transformers for stand-by service when all available transformers were needed for regular service.

To release these spare transformers, the utility and Westinghouse engineers jointly studied the application of capacitors. The result was the construction of a portable capacitor bank.

Today, portable units are vital equipment in helping this utility meet its power demands. Rolling up to a transformer bank where failure has occurred, the capacitors keep the bank of open delta-connected transformers operating at full rating. Furthermore, the same portable capacitor unit can be used for banks of different ratings—600 volts and 2400 volts. Thus, several mobile capacitor banks can release a large number of stand-by transformers of various ratings for continuous service. This idea can be used to advantage by utility systems where delta-connected transformer banks supply lagging power-factor loads of from 70 to 90%.

This is one of the many ways Westinghouse engineers can help power companies maintain service or increase capacity with a minimum expenditure of money and critical materials. They may be able to help you on similar problems. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-97069

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

SPEED War Plant MAINTENANCE AND INSTALLATIONS In Masonry and Concrete with PAINE ANCHORS

LEAD EXPANSION TYPE

Fig. 910 Fig. 900

★ Simply place in hole, tap with setting tool and tighten
★ Save time, effort and get permanent workmanlike job
★ Precision threaded, rust and vibration resistant

Fig. 900 available in 9 different diameters 6-32 to ⅝". Fig. 910 in ¼", ⅜", ½" diams. in standard lengths. Ask your Supplier and Write for Catalog.

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SMOOT-HOLMAN COMPANY
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LUMINAIRES FLUORESCENTS
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INDUSTRIAL AND COMMERCIAL LIGHTING EQUIPMENT

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INGLEWOOD, CALIFORNIA

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REPRESENTATIVES
FRED ZAUGG, 907 N.W. Irving St., Portland, Ore.
COAST SALES CO., 307 Main Street, Seattle, Wash.
STEVENS SALES CO., 41 Post Office Place, Salt Lake City, Utah

Fred B. Lewis Retires From Active Service With Edison

Fred B. Lewis, vice-president of the Southern California Edison Co. since 1931, has retired from active service with the company. He remains as a member of the board of directors.

Announcement of Lewis' request for retirement was made at the recent annual meeting of Edison stockholders.

Lewis entered Edison service July 6, 1905, in the test department. In 25 years he rose to the position of vice-president and general manager, holding that position until 1942. During the past year he has been vice-president, a director and a member of the executive committee.

● N. B. HINSON, executive engineer of Southern California Edison Co., has been named chairman of the Electric Power Interchange Committee, formed to meet the demands for power in war production. He succeeds Fred B. Lewis.

● JULIAN GARRETT, manager, Northwestern Utilities Ltd., Edmonton, Alberta, has been elected president of the Edmonton Community Chest. He was former chairman of the budget committee of the Community Chest.

● FOUR WESTERNERS were among 18 industrial electronic specialists recently appointed by General Electric Co. They are L. E. DONAHUE, Los Angeles; J. A. SETTER, Denver; A. D. BOARDMAN, San Francisco; and L. R. ELDER, Portland.

● ASH WOOD, sales manager for Littelfuse, Inc., at El Monte, Calif. was elected a vice-president of the company at a recent meeting of the board of directors. The El Monte plant was established in 1942.

● ERIC N. BLANNIN formerly with Anaconda Copper Mining Co., is now government electrical engineer and inspector at Fort Peck dam.

● LOREN A. WOOLF, formerly of Pacific Gas and Electric Co., Oakland, is now a lieutenant stationed at Camp Callan.

● J. R. GERMINO, of Pacific Gas and Electric Co., is a warrant officer in the U. S. Navy at Dutch Harbor, Alaska.

● J. O. PAUL, with Pacific Gas and Electric Co., San Francisco, is a radio technician in the Navy.

● ROBERT R. MYERS, with Southern California Edison Co., Long Beach, is now in the Navy.

Answer to "Who Am I?"

(See Page 78)

R. M. Alvord

Electriquiz Answers

(See Page 79)

1. The electric clock. Power use is two watts, about 1/5 that of an electric razor or 1/50 that for the ordinary 100-watt lamp.

2. a. 50c. The power bill for 2 watts for a year at the average rate of 3c per kwh. is 52.6c.

3. 4c an hour. Time spent in winding, setting and checking a mechanical clock is found to be about two minutes per day.

4. The power house operator regulates the electric clock by increasing or decreasing the speed of the main generators and the clock responds accordingly.

5. 655,000 gal. The newer plants of good efficiency and with a head of 600 ft. will generate with this amount of water the 1,000 kwh. used by the average consumer in one year.

6. Not affected. The water is returned to the original stream bed with a loss of energy but this loss is the same as that from the flow of water in the stream bed to the point of release.

7. The water content of snow is held in storage until melted by the sun. This property decreases the size of dams and reservoirs for a plant and permits more efficient use of the precipitation.

8. No. Batteries are used for storage of small amounts of power for special purposes, but commercial power which is practically all alternating current must be used as it is generated.

9. Silver.

Refrigeration Engineers Elect New Officers

Election of W. Dowling as president of the Refrigeration Service Engineers' Society was announced at Calgary, Alta., recently.

Other officers are: Blake McLean, first vice-president; E. McKenzie, second vice-president; R. Fisher, secretary; P. Naftel, treasurer; A. D. McArthur, sergeant-at-arms; and G. Slinn, W. Hymas and S. Litchinsky, directors.

Since the Calgary Chapter was organized a year ago, the membership has increased more than 75%.

● A. "Doc" Smedley, former manager, Anaconda Wire & Cable Co. at Los Angeles and prominent speaker on the subject of wiring adequacy, resigned from that company when sent east. He has now returned to Los Angeles and is with Airsupply & Curtiss Electric Propeller Co.

● One of Six war industry workers so honored, Kim Hong, chief electrical engineer for the Moore Dry Dock Co., was named to represent the company's Chinese contingent at the annual conference of the National Association of Manufacturers in San Francisco on April 13.

● Douglas H. Loukota has been appointed director of sales and new development for Cannon Electric Co., Los Angeles. Succeeding him as sales manager is William V. Brainard, formerly Cannon representative in the northern California district.

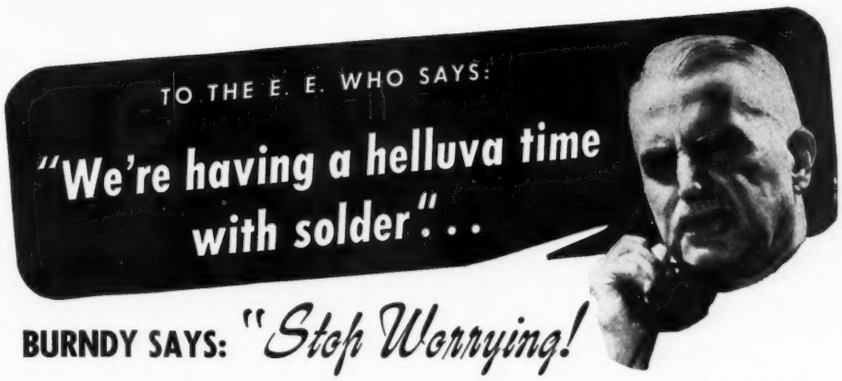
● W. G. Murrin, president of the B. C. Electric Railway Co., has been appointed president of a central booking and production office to look after provision and entertainment for the armed forces.

● Earl Dunsmuir, head of the Dunsmuir Electric and president of the Vancouver Electrical Assn., has now been elected as a director of the Kitsilano Chamber of Commerce.

● W. D. Kyle, president of Line Material Co. of Milwaukee, visited the Los Angeles and San Francisco offices of his company last month, following a brief vacation in Arizona.

● E. N. Horsey, chief engineer B. C. Electric Railway Co., Victoria, has been elected a director of the Victoria Chamber of Commerce.

● W. L. Wallace, of the California Electric Power Co. at Randsburg, Calif., is now in the Navy.



BURNDY SAYS: "Stop Worrying!

You don't need a drop of solder to make a good joint!"

Burndy left the solder pot behind over 20 years ago — and the millions of sound Burndy *solderless* connectors since put in service under every conceivable operating condition prove what a great step forward this was!

For tiny wire connections, or for the largest conductor connections for heavy current loads, Burndy *solderless* connectors replace the messy, time-wasting solder pot with simple clamping elements . . . providing SPEED and EASE and a BETTER ELECTRICAL CONNECTION.

Whatever connector problem may be bothering you today, Burndy has either solved it in 20 years of specialized engineering in this field — or will solve it for you now, with a connector custom-made to fit your needs. Call in a Burndy representative. If he can't show you time and cost savings decidedly worth-while, invite him to go fly a kite!

Burndy

the answer to your electrical connection problem

OVERHEAD · UNDERGROUND · POWER · WIRING · GROUNDING

Burndy Engineering Co., Inc., 107 Eastern Boulevard, New York City

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Manufacturers' Representatives and Distributors

BROWNING MFG. CO.
"V" Drives—Paper Pulleys—Pivoted Bases

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Heat Resisting Wire and Cable

H. B. SHERMAN MFG. CO.
Connectors—Lugs—Terminals

U. S. GRAPHITE CO.
Motor and Generator Brushes

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USE Mailway Banking

NIGHT OR DAY

Make deposits when you want to . . . right at the nearest mailbox. No need to "go to the bank." Nine out of ten transactions are routine that can be handled by our Mailway service, night or day, Sundays and holidays. Our special Mailway envelopes and passbook make service quick and safe.

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Herman D. Steel
Meter Jewels
Kellems Co.
Cable Grips for Pulling and Permanent Support.
Minerallac Electric Co.
Insulating Compound, Clips, Hangers and Statiscopes
Schweitzer & Conrad
Fuses and Protective Devices
Specialty Device
Cone Anchors, Guy Guards and Earth Augers
The States Company
Test Blocks and Meter Testing Equipment
R. Thomas & Sons Co.
Pin-type and Suspension Insulators
Electroline
Wire Rope Fittings

TRADE *notes*

Dr. Brandell Speaks at Tri-State Supply Meetings

There is more to a carbon brush than meets the eye, was the conclusion of those who heard Dr. I. W. Brandell, sales manager of Ohio Carbon Co., Cleveland, at two meetings in Los Angeles and San Francisco, called by the Tri-State Supply Corp., manufacturers' agents for the Ohio Carbon Co. With an elaborate display of materials which go to make up a carbon brush, and samples of various compositions of brushes, Dr. Brandell described their manufacture and the special requirements of various types of motors and generators which had to be furnished in an appropriate brush type. Explaining that there were over 3,000,000 different brushes, he pointed out why it was so difficult to catalogue them with continuous development of new grades.

He stressed the importance of telling the brush manufacturers exactly what kind of work is to be performed by the machine on which it is used so that the appropriate brush may be selected. He cautioned against the use of sand paper on commutators, since grains of sand often remain in the slots and cut the brushes. The importance of loading in respect to type of brush used was also stressed and he said that the correct brush material for one motor may not be best for the same motor under other conditions.

● C. C. MATTHEWS, head of the Matthews' Music House, Calgary, Alta., has retired from business for at least the duration. Scarcity of electrical appliances, radios, pianos and other lines handled influenced him in his decision. Merchandise remaining on hand has been sold to Robinson and Sons of Edmonton and after 30 years in business in Calgary. Matthews will now devote his full time to his large stock farm which he established a number of years ago for the purpose of breeding pure-breed cattle and horses.

● FAIRVAN C. FAWCETT and WALTER E. NAPSTEAD have registered their partnership in the business of Fawcett Radio Sales & Services, Vancouver, B. C.

● STEVE MATHEWS has opened a new radio service shop at Powell River, B. C. He was formerly in business at Langley Prairie, B. C., and at Vancouver.

TORK CLOCKS

THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

NOW—lower prices and higher capacities

There is a Tork Clock for every regular switching job: 60 minute, 4 hour or daily cycles.

Bulletins on request

THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.

Western Representatives:

A. R. Slimmon, 445 E. 3rd St., Los Angeles
Geo. H. Curtiss, 540 McAllister St., S. F.
H. M. Sayers, 1101 Eastlake Ave., Seattle
Stevens Sales Co., 41 P.O. Place, Salt Lake City
Felix Simon, P. O. Box 614 . . . . . Denver
H. Geo. Shefler, P. O. Box 1587 . . . Phoenix

CLASSIFIED SECTION

WANTED

Two used full Diesel Electric Sets. Each 400 or 500 KVA, 3 phase, 60 cycles, 2300 volts. Give complete description and price crated.

Write Box 43, Electrical West
68 Post Street, San Francisco, Calif.

Unusual Combination of Experience Available

1. Thorough grounding in modern management methods, professional experience in industrial engineering, student of economics and post war planning.
2. Complete and thorough experience in sales management, advertising and promotion of technical products to manufacturers, jobber and consumer markets.
3. Very extensive technical knowledge based on engineering (electrical) training and physics. Broad knowledge of materials.
4. Working knowledge of general accounting and specific experience in cost accounting.
5. Working knowledge of modern machine shop production techniques and tools
6. Extensive experience in product design.
7. Expert in all phases of commercial research. Now employed in responsible executive position—seek greater opportunity for aggressive, constructive action. Married, age 42.

WRITE BOX 53, ELECTRICAL WEST
68 POST STREET, SAN FRANCISCO, CALIF.

Member A.I.E.E
JULIEN H. DAVIS
Consulting Engineer
Industrial
Utility-Electrical-Mechanical
740 So. Broadway Los Angeles, Calif.

Triangle Pacific Announces Sales Personnel Changes

Triangle Pacific Co. has announced the following changes in sales personnel:

C. H. Kaufman has been appointed district manager for an area comprising California south of Bakersfield, Arizona, and Las Vegas, Nev. His headquarters are at 340 Azusa St., Los Angeles.

Rex Larsen has been made district manager for northern California, all of Nevada except Las Vegas, and Utah, with headquarters at 1045 Bryant St., San Francisco.

Robert Sloane has been named district manager for Oregon, Washington, Idaho and Montana west of Billings, with headquarters at 95 Connecticut St., Seattle.

● CONTRACT for wiring the new premises of the Pacific Fisheries Experimental Station at 898 Richards St., Vancouver, B. C., has now been completed by Ricketts-Sewell Electric, Ltd. Involving an expenditure of approximately $3.000, the work consisted of installing an efficient lighting system for offices and laboratories, and power layout for cooling refrigeration and controls.

● GALE F. THOMAS, in charge of Smoot-Holman Co. activities in the San Francisco area, has been transferred to the Inglewood plant of the company as plant engineer. Everett C. Adams, formerly with Thomas in San Francisco, is now in charge of that division, according to L. A. Hobbs, assistant general manager.

● BRETTELL LTD., Vancouver, has announced discontinuation of its retail business. This firm has operated both a wholesale and retail business for many years. In future the firm will engage wholly in the wholesale trade with the exception of lighting fixtures which will be sold at retail as formerly.

● J. H. MCRAE CO. LTD., Vancouver, B. C., has been awarded the electrical contract in connection with the $275.-000 naval station and college under erection in Vancouver Harbor for the federal government.

● HAROLD DUNN has moved his radio and radio service business from 651 Second St., Medicine Hat, Alberta, to Third St. and Sixth Ave.

● ABLETT ELECTRIC CO. has closed out its business at Kelowna, B. C.

...that pint you gave

It may be that many months may pass before the blood you gave will save a life . . . the place may be thousands of miles away.

The preparation of blood plasma is a meticulous process in which a special type centrifuge plays an important part. Centrifugal force, developed at enormous speed, with smooth acceleration, packs down the red cells and increases the yield of blood plasma. This calls for sturdy equipment, built for continuous duty.

The Ward Leonard Rheostat shown on this International Blood Plasma Centrifuge was selected as the motor control because of its dependability, its many accurate steps, and its electrical interlock which assures a slow start irrespective of when the switch is closed.

Ward Leonard Rheostats are available in a wide range of sizes for single and multi-mounting, manual or motor drive. Send for bulletins describing these and other type rheostats.

ARMY E NAVY

WARD LEONARD

RELAYS • RESISTORS • RHEOSTATS

Electric control (WL) devices since 1892.

WARD LEONARD ELECTRIC CO., 68 SOUTH STREET, MOUNT VERNON, N. Y.

HELWIG SPEER

HELWIG COMPANY

Carbon Products

D. E. Lamore
Ninth & Harrison Streets
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Richardson Electric Supply
166 Jackson Street
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C. E. Riggs
324 N. Broadway
Portland, Oregon

F. S. Fletcher
225 W. Pico Blvd.
Los Angeles, Calif.

Complete the Job with TRICO

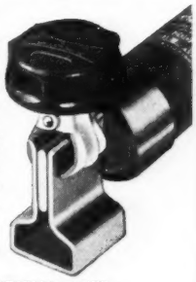
FUSE PULLERS

Contribute to the war effort by protecting manpower. Equip every fuse cabinet with TRICO FUSE PULLERS. It's cheap insurance against unnecessary accidents.

WRITE FOR BULLETIN NO. 5

KLIPLOKS

LOCK LIKE A VISE



Make every job complete by installing TRICO KLIPLOKS and save critical materials. Poor contact causes high resistance resulting in unnecessary shutdowns — destruction of fuses and clips — premature fuse blowings — wasted current — unnecessary repairs.

WRITE FOR BULLETIN NO. 6

COAST REPRESENTATIVES

W. E. Young Co., 1944 Broadway, Denver
H. H. Van Luven, 307 E. 3rd St., Los Angeles
Albert S. Knight, 3006 Western Ave., Seattle
Pacific Industrial Products Co.
9th & Harrison Sts., Oakland, California

TRICO FUSE MFG. CO., Milwaukee, Wis.

ALL KINDS
of SMALL
TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformers to exactly match your requirements. If not in our regular line, we build to meet your specifications—in a hurry!!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles, Calif.

"WHAT CAN IT DO FOR ME?"

Advertising that is read with this thought in mind may provide the solution to a problem that has kept you awake nights.

We all know "It Pays To Advertise." It pays just as big to investigate WHAT IS ADVERTISED—every month in

ELECTRICAL WEST

Sylvania Holds Meetings On Pacific Coast

Don G. Mitchell, vice-president in charge of sales of Sylvania Electric Products, Inc., and Robert H. Bishop, sales manager of the Lighting Division, as well as L. Oliver, sales manager of the Radio Tube Division, were guests of honor and speakers at two dinners in Los Angeles and San Francisco for the Sylvania wholesalers and dealers given by Perry Demarest, division manager, last month. Mitchell, who, when he left college, went to work for McGraw-Hill Co. at New York, and subsequently has been in sales executive positions with the American Can Co. and more recently Pepsi-Cola, gave an inspiring glimpse into the future of the lamp and electronics field.

When the war ends the need for salesmanship the first year and a half will be in staggering proportions, he declared. The American public must be sold $135 billion worth of goods, 35% more than the boom year of 1929. This means approximately $1,000 per man, woman and child. The alternate is the unwanted picture of millions walking the streets out of jobs. Competition after the war will be keener than ever before, with more products to sell. Labor will be demanding higher wages. Management will mean far more than ever, especially sales management.

He then dwelt upon some of the possibilities for future salesmanship. Airplane companies will make cars of lightweight metal with higher power, bridges will be built of lighter metals, there will be prefabricated housing, fluorescent lamp development will be such as to stagger the imagination. The cathode ray tube will bring television as well as many industrial uses. Stropatron, a flashing tube, will be used to analyze machine motion. Infrared lamps will be used extensively in drying. Electronic tubes will eliminate the gear box in the control of speed in all kinds of machines. Industrial x-ray, electronic cleaning of the air, photo-electric color analyzers, cosmic ray counters, electron microscopes, sterilizing tubes, electronic measurement of brain waves and even the possibility of electronic transmission of power hold potentialities to meet that challenge.

Mitchell

G.C.A.
Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks
Send for Catalogue
We have been making safety tools for 26 years
THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

TRADE MARK REG. U.S. PAT. OFF.
Nichrome
***Made only by* DRIVER-HARRIS COMPANY**

Stocked for the Coast Trade at

SAN FRANCISCO
235-241 San Bruno Ave.

LOS ANGELES
449 South San Pedro St.

SEATTLE
2122 Fourth Ave.

By
ANGUS-CAMPBELL, INC.

● Ricketts-Sewell Electric Ltd. is wiring the new offices and warehouses of the Vancouver Supply Company at 25 Alexander St., Vancouver, B.C. Original premises of the company were destroyed by fire. The new offices will be equipped with fluorescent lighting and a modern lighting installation also is planned in the warehouse portion of the premises.

Sherman

SPLICING SLEEVES

Precision Made for Enduring Service

Split Tinned Sleeve

the "Figure 8"

Seamless Oval

These Sherman Splicing Sleeves make the finest of joints—strong, secure, free from corrosion. All sleeves made to accepted standards of the electric utility trade, stamped for identification, and carefully packed. For uniformity and unfailing dependability, standardize on Sherman sleeves.

H. B. Sherman Mfg. Company
Battle Creek, Michigan

Write ——for Sherman catalog illustrating the complete Sherman line of Electrical specialties and giving full specifications.

Solder Prohibited

IN WIRE JOINTS

Wherever Wire Connectors Containing No Copper or Copper Alloys Can Be Used

COMPLY WITH GOVERNMENT REGULATIONS

Government Departments or Agencies which have issued orders, specifications, or recommendations to discontinue the use of solder type joints, see listed below:

- Critical Construction Materials Design Guide, Feb. 19, 1943, page 23 Section E.
- War Dept., Office of the Chief of Engineers, Section XXXIV, Oct. 20, 1942, page 34-02.
- W.P.B., War Housing Manual, Dec. 12, 1942, page 31, article 370.
- Army and Navy Munitions Board, Bulletin Jan. 1, 1943, To Supply Services, Etc., page 19, article 5.

IDEAL

Wire Nuts

Solderless Tapeless Wire Connectors MEET ALL GOVERNMENT REQUIREMENTS

By discontinuing the use of wire joints which require either Solder, Copper or Copper Alloys you help conserve critical metals and comply with Government Agency Regulations.

IDEAL "WIRE-CONNECTORS"
An Alternate and Improvement for Solder and Tape

IDEAL "WIRE-NUTS" require no solder, copper or copper alloys, therefore meet all requirements. Easy to apply: STRIP WIRES, SCREW ON, THAT'S ALL! Cut Costs—Speed War Work. Sizes for all joints from two No. 18 to three No. 10, Solid or Stranded Wires. Millions in use.

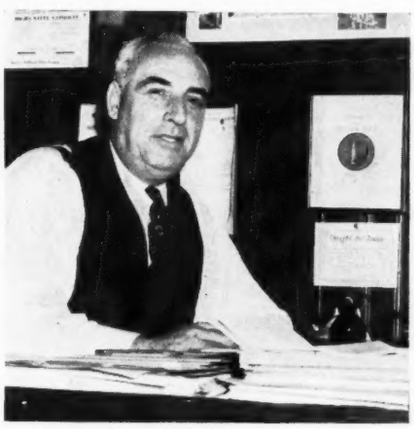
Leading jobbers will furnish samples
AVAILABLE FOR IMMEDIATE DELIVERY

IDEAL SOLD THROUGH JOBBERS

IDEAL COMMUTATOR DRESSER COMPANY
WEST COAST WAREHOUSE STOCKS:
Strieby & Barton, Ltd., 912½ E. 3rd St., Los Angeles, Cal.
F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
L. S. Foley, 1233 N. W. 12th Avenue, Portland, Oregon
Robinson Sales Co., 3215 Western Avenue, Seattle, Wash.

Listenwalter & Gough Promotes James Addis

Phil G. Gough, president of Listenwalter & Gough, Inc., Los Angeles, announced that James S. Addis had been promoted to vice-president and a member of the board of directors. Joining the company in March 1919, Addis had just been with the company 24 years. He was formerly sales manager of the supply department. James Hrabetin was appointed sales manager of the supply department in his place. Roy Henry, manager of the credit department, also was elected to the board of directors. Complete conversion of



Addis

the merchandise department, which had been Philco's largest distributor, has made available to Listenwalter & Gough dealers a whole new line of furniture and housewares with which to survive the war. A new catalogue recently issued pictures this wide variety of lines.

● Bert Deleray has been appointed district manager of the San Francisco office of Tri-State Supply Corp. by A. H. Howard, secretary and general manager of that company, Los Angeles. Howard also announced that an office and warehouse of the company would soon be opened in Seattle. Deleray for the past several years has been with the Westinghouse Lamp Co. and since 1937 has been Los Angeles manager for the Lamp Division. Born in Tuolumne, Calif., a graduate of California in mining, after attending officers' training camp during World War I he returned to mining until the 1920s. He joined Westinghouse in 1926.

● Line Material Co., of Milwaukee, Wisconsin, has announced the appointment of J. E. Redmond Co., Phoenix, as its agents for the state of Arizona. Address of the Redmond Co. in Phoenix is P. O. Box 2221.

H. H. VAN LUVEN

307 East 3rd St. Los Angeles

MUtual 5173

●

Manufacturers' Representative

S. H. COUCH CO.
Telephone Equipment—Annunciators —Push Buttons—Blake Staples

LENZ ELECTRIC MFG. CO.
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Electric Sirens

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CANNON ELECTRIC DEV. CO.
Hospital Signal Systems—Motor Plugs and Receptacles

TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain

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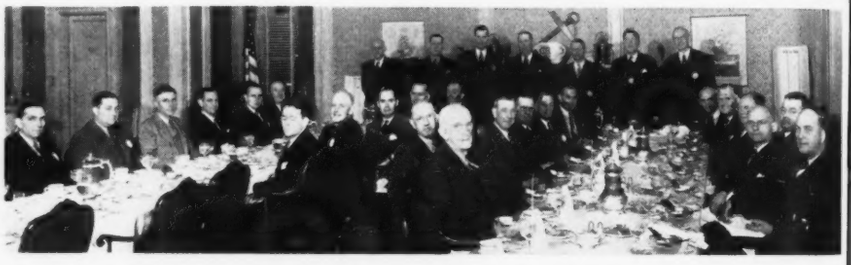
PROFILES *of the month*

Homing pigeons have long been the hobby of Harry R. Noack, commercial vice-president and regional supervisor of supply sales, General Electric Supply Corp., San Francisco. His pets have found their way home to him from as far away as Montana. Talking about homing pigeons, their training, the races held annually with them and their use in wartime, to the San Francisco Electric Club, he brought some of his pigeons along. Two old time wholesaler friends and competitors, Ed Duggan of Wesco, and Phil Carson of Graybar, sat at head table with him.



Top luminaries of Sylvania Electric Products Inc. met at two dinners, Los Angeles (pictured above) and San Francisco, with distributors of its lamps and radio tubes, while on a trip to the West not long ago. Head table guests introduced by Perry Demarest, (center) division manager, were Don G. Mitchell, vice-president, (left of him) and Robert H. Bishop, lighting division sales manager

Even experts like E. C. Watts (left) and Walter Schanz, Westinghouse Electric Appliance Division service representatives at San Francisco and Seattle, respectively, take a "refresher" course as part of the company's "Conservice program

VICTORY GARDEN CROPS

GIVE YOU

FLAVOR—VITAMINS and MINERALS

Hi-ho, you Victory Garden Farmers! Come harvest day and the reward for your hard labors will be eatments as tasty as any you ever tucked away under your napkin.

Crispy-fresh, fully ripened garden produce has flavor plus! It has vitamins at peak of vitality and minerals at full nourishment.

Use your garden crops fresh picked or pop them at once into your refrigerator. Most vegetables should be cooked in covered utensils and little water. Too much water and too much heat and air destroy their nutritive value.

Remember you are a food hoarder with a halo when you raise garden produce in your Victory Garden. Your government has called for 20,000,000 Victory Gardens. Plant and replant and beat the Axis in your own backyard.

P·G·and E· PACIFIC GAS AND ELECTRIC COMPANY